APRIL, 1931

7TH TIER

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Contractors and Engineers Monthly

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Winter Construction in Northern Ontario
See page 77

Including
The Consulting Engineer

Cranemobile handier than truck crane here . . . and saved 2 men!

In widening Lexington Ave. between 72nd and 86th Streets, New York City, Poirier & McLane, general contractors, used this Bay City Cranemobile in preference to a truck crane. In order to widen the avenue, the ventilating ducts of the Lexington Ave. subway had to be moved back nearer to the building line. To do this, called for considerable excavation.

A series of ordinary side dump buckets, spaced about 10 ft. apart, were used, and the Cranemobile moved forward and backward in dumping these into the truck. One man, sitting on a revolving seat, operated the entire machine. Since the Cranemobile has no overhang, no flagman was required to keep traffic from running into it .

The Cranemobile has three speeds ahead and reverse. Handles ⅜ yd. shovel, ⅜ yd. clamshell, and ditcher attachment.

Truckmen, industrial plants, material yards, lumber yards, crane service companies—all who desire a fast mobile unit—should write for full details.

BAY CITY SHOVELS, Inc.
Bay City, Mich.
N. Y. Office, 302 Broadway

BAY-CITY SHOVELS

THE BAY-CITY FAMILY OF FAST WORKERS

Building a New Dike *with a* Sheet Pile Cut-Off

Flooding to Be Stopped and Airport Area Created by the South Meadows Dike, Hartford, Conn.

Filling at the Site of the Old Borrow Pit. Sheet Piling Is Shown at the Extreme Right

By
Willard S. Brewer
Division Engineer
Department of Engineering
Hartford, Conn.

SOUTH MEADOWS DIKE is being built to protect the South Meadows, so called, at Hartford, Conn., from flooding during periods of high water in the Connecticut River. These meadows, about 1,000 acres in area, are located in the southeasterly portion of Hartford, lying between the Connecticut River and the higher land along Wethersfield Avenue. The normal summer river level is from Elevation 4 to 5, while the highest recorded flood, in 1854, was at Elevation 31.4. The lowest land in the meadows is about at Elevation 6 and the highest about 20. Brainard Field, Hartford's municipal airport, is located on this higher portion of the meadows, and, on the average, is flooded once a year for a duration of three or four days.

The dike is located along the river from Wawarme Avenue to the city line, a distance of about 2 miles, and thence swings westerly a length of about one mile to near Wethersfield Avenue, the total length being about 3 miles. The dike is to consist partly of a compacted fill, composed of the fine silty sand of the meadows, and partly of a fill composed of sand from the bed of the river.

The construction of the dike will allow the uninterrupted use of the aviation field. This field is now about 100 acres in extent, but the city owns about 600 acres and it is expected that by the time the dike is completed the field will be extended to occupy most, if not all, of this area.

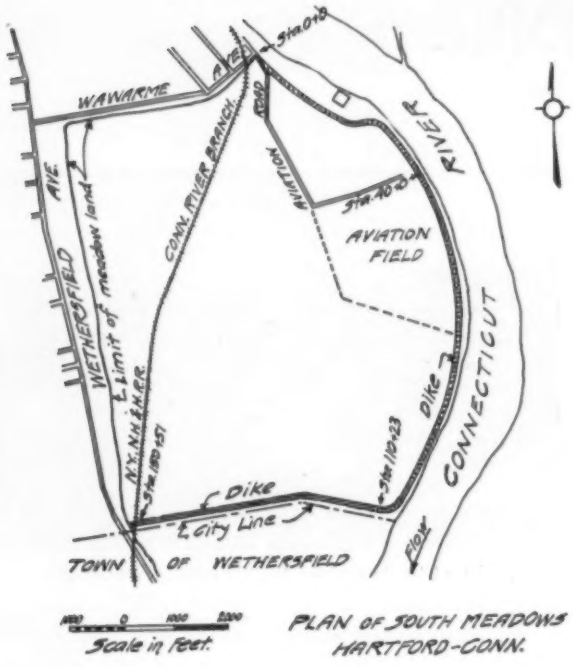
Investigation

In the investigation for the project numerous wash drill borings were made along the proposed dike location and a number were made in the meadow area. These borings showed that the soil structure of the meadows was, in general, as follows: first a layer of fine compact sand or of fine silty sand from 10 to 15 feet in thickness, then a layer of sand, medium to coarse, this layer connecting directly with the river, then clay which appeared at from 24 to 40 feet below the ground surface. Several borings were carried into the clay 15 to 25 feet.

Soundings in the river disclosed that the layer of coarse sand had only a small quantity of fines in it, and was therefore not suitable for use alone in the dike, but would serve as the bulk of the dike if the watertightness was provided by some other material.

Several wells were driven in the meadow and observations were made on the water level for a period of several months. Comparison of these levels showed that the ground water near the river was at approximately river level and that it rose only slightly to the west, indicating a free movement of water in the coarse sand.

Permeability tests were made on samples of the silty



sand of the meadows for several locations. These tests indicated that this material was very impervious and well adapted for dike material.

DESIGN

The general features of the section adopted for that portion of the dike adjacent to the river is shown on the cross-section. The dike is made 50 feet wide on top so as to serve for a future roadway. Its top is at Elevation 35 which is 3½ feet above the highest recorded flood. As there are only occasional floods above Elevation 25 the silty sand rolled embankment is brought to this elevation. The remainder of the section is of river sand, except for a facing of the silty sand which will form an impervious blanket and, above Elevation 31.4, will serve as a material for starting grass. The slope protection is a heavy toe of stone with a hand-laid paving up the slope. The sheet pile cut-off extends from within the fine top stratum down through the underlying coarse sand stratum and into the impermeable clay beneath the latter. Its purpose is to prevent the river water from flowing through the coarse sand stratum beneath the dike and possibly boiling up at some place inside the dike where the layer of overlying fine sand is thin. In order to determine the thickness of the several sand layers and the elevation of the top of the clay, wash drill borings were taken every 150 feet along the line of the piling. These were in addition to the preliminary borings taken over the proposed dike location. If the elevation of the clay in adjacent holes varied more than 2 feet an additional boring was made in between. The results of these borings were plotted on a profile along the line of the cut-off and the top and bottom of the cut-off drawn, keeping the top from 7 to 8 feet above the bottom of the silty sand and the bottom 4 feet below the top of the clay. The piling length ran from 30 to 42 feet. At the extreme westerly end of the dike, the sand layer ran out, the clay gave place to hardpan and rock which rose higher and the sheeting in this section varied from 30 feet down to 14 feet in length.

CONSTRUCTION

On March 28, 1930, two contracts were let, one for clearing and grubbing and one for the sheet pile cut-off.

CLEARING AND GRUBBING

The dike location was largely grown to brush and weeds, with a small wooded area, some grass land and some swamps. The trees were cut and used for wood and the brush and weeds burned. The stumps were removed by a Northwest and a Bucyrus-Erie gas power shovel and these machines were very successful with all sizes up to the largest of about 3 feet in diameter. On the large ones the shovel would remove the earth from about three-quarters of the way around the stump and then get underneath and take out stump, roots and all. A number of the resulting holes were more than 6 feet deep.

SHEET PILE CUT-OFF

This cut-off extended the entire length of the dike, a distance of 15,051 feet. It consisted of steel piling, ⅜-inch thick, Bethlehem section AP-16, weighing 29.3 pounds per foot of piling and 22 pounds per square foot of wall in place. It was driven by two hammers working in fixed leads on a traveler running on rails at one side of the line of sheeting, the near rail being 2 feet from the sheeting line. This traveler, 20 feet wide, 40 feet long and of a height of 56 feet above the rail had a derrick at its forward corner, farthest from the rail, which picked all piling from the ground and placed it in position for driving. The piling was shipped from the mill in interlocked pairs and was handled and driven in this manner.

The leads were placed 5 feet, 4 inches apart, center to center, equal to the width of two pairs of piling or four sheets. The hammers were offset, thus allowing the traveler to move back and forth at all times without being interfered with by the sheeting. Driving was begun on May 7, at the northerly end and was continuous for the entire length of the job. During the first part of the job two Vulcan hammers were used. Each hammer weighed 10,400 pounds with a ram weighing 5,000 pounds. The hammer, having a 42-inch stroke, delivered 60 strokes of 15,000 foot-pounds each per minute. Throughout this first section the top of the piling in its finished position was from one foot to 12 feet below the surface of the ground due to the fact that here the silty sand layer was quite thick and also because the dike location traversed land on which some filling had been done. For the driving where the top was below ground a follower was used and for this portion the resistance to the driving became very great. The progress was so slow during the first few weeks, averaging about 175 feet per week, that it was deemed advisable to build another traveler to do the follower work. Accordingly a small one was made up to straddle the piling line, with the hammer on the rear face. A McKiernan-Terry No. 11B hammer was used for this. This traveler began work at Station 5+76 and finished at Station 30+25 where the top of the sheeting was at about ground surface. From this point to the end of the job all driving was done by the

first traveler as the top of the sheeting corresponded in general with the ground surface. The hammers were shifted around, however, before the follower rig had completed its work, the McKiernan-Terry hammer being placed as the second hammer on the first traveler and one of the Vulcans placed on the follower. After the follower rig had finished, this Vulcan was used as a spare hammer on the first traveler.

After the first traveler began driving to the ground surface only, at Station 5+76, it began to make better speed, and although at Station 16+0 it had to mount a 10-foot fill and then drop down at Station 20+0, and again at Station 23+0, rise up again about 10 feet to go across a railroad to a coal yard, it made an average progress here of 324 feet per week. From Station 23+0 southerly the ground to be traversed was the meadow, with the exception that from Station 40+0 to 46+0 there was an old borrow pit about 5 feet below the general surface. The progress schedule called for Station 40+0 to be reached by August 1 and, despite the difficulties encountered, the traveler on the night of July 31 stopped at Station 40+60. The driving began to go still faster, and on September 1 it had reached 78+60, and on October 1, 120+55. Between here and the end at 150+51 there were several swamps to cross, but the weather for the entire season had been so dry that only one swamp contained water, and this one was drained before the traveler reached it. By extremely good work all these swamps were crossed on blocking. The last sheeting was driven on October 22, just 145 days, excluding Sundays, from the day driving was begun. There were very few days lost by rain, and, not allowing for these, the daily rate of progress was 104 feet per day. There were two days when 300 feet were made each day.

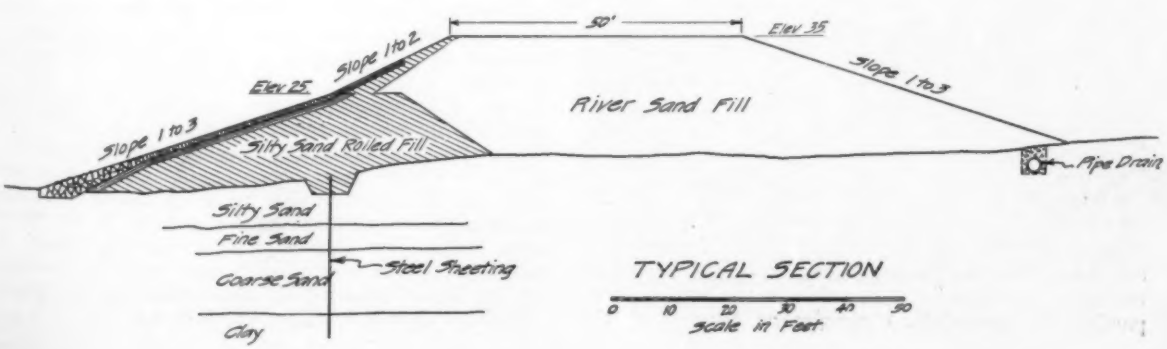
In making up the specifications for this work the time had been fixed at 200 working days, arrived at from the advisability of having the sheeting all driven before the spring freshet of 1931. It had been considered that 50 feet per day would be good progress for one traveler and therefore to complete more than 15,000 feet in this time, it would be necessary to have two machines working independently. As a matter of fact, with the exception of the follower driving for 2,450 feet, the one traveler equipped with two hammers did the entire work, and in less than three-quarters of the time allowed. It was a remarkable piece of work, due to the untiring energy of the contractor and his force, coupled with the good working conditions arising from an extremely dry season.

Clearing and Grubbing with a Bucyrus-Erie Gas Shovel

DIKE CONSTRUCTION

The contract for the construction of the dike was awarded on August 29, 1930, and work begun on September 19 at Station 24+0 just south of the Hartford Electric Light Co. coal storage. First the weeds which had grown since the grubbing contractor finished were removed. Where the growth was small, it was done very quickly by having the bulldozer scrape the surface. This cleared the ground quite effectively as it took the small debris and some of the root mass. The specifications called for plowing 8 inches deep under the silty sand embankment but trial showed that better results were obtained by the use of a large disc harrow having discs 22 inches in diameter. This was pulled lengthwise of the dike by a tractor and thoroughly cut the surface to a depth of from 8 to 10 inches.

The next operation was the excavation and refill of the cut-off trench. For the first 1,500 feet the material excavated was silty sand and quite suitable for refill. Further south part of the material was suitable, but part consisted of sand layers. Where the latter condition existed the excavated material was placed on the inside portion of the silty sand embankment and material from the borrow pits brought in for the refill of this trench. The excavation at first was by a shovel with a pull-bucket and later with a



The Main Traveler in the Foreground with the Small Follower Rig Further Back

dragline. Where the material excavated was refilled a backfilling machine ran back and forth along one side of the trench and pulled in small quantities at a time. The compacting of this refilled material has so far been done by hand and power tampers. The trench, only 3 feet wide each side of the sheeting, was too narrow for a roller. The hand tampers, used at first, were soon discarded for compressed air machines and resulted in a much better compacted fill. Where the ground surface was not above the top of the sheeting, it was tamped to within 15 inches of the top of the sheeting, then filled to just above the sheeting and rolled by the tractors.

The silty sand portion of the dike embankment is being built with material from borrow pits in the meadow. It has been loaded by two Northwest gas shovels, one 1½-yard and one 1-yard, and transported with pneumatic-tired trucks having dual wheels on the rear axles. The shortest haul was about 500 feet and the longest about 1½ miles, while the number of trucks used varied from four at the start to a maximum of thirteen. The work of filling continued until November 28, when due to cold weather the ground and the dike surface became frozen for several inches and it was deemed advisable to stop. The meadow surface held up the trucks very well during September and October when there was very little rain, but some repairs were required during November when the rains softened the top surface.

The spreading and rolling was accomplished by two Caterpillar Sixty tractors, one pulling a Slate scraper roller of 5-yard capacity, and the other equipped with a LaPlant-Choate hydraulic bulldozer. The trucks, of course, accomplished considerable in the way of compacting the materials, especially as throughout the greater part of the work they were brought in over the completed portion loaded, then dumped and sent back over the meadow road. Then too the filling was kept spread out over a length of 500 to 1,000 feet, so there was a great deal of travel over the embankment as it was being brought up.

Up to the cessation of work on the embankment about 90,000 cubic yards had been placed over a length of nearly one mile. To complete the dike will require about 230,000 cubic yards of the silty sand fill and 950,000 cubic yards of river sand, which latter will be pumped in from the river by a hydraulic dredge.

RIPRAP

For the riprap toe, trap rock as it comes from the quarry face had been used. It runs from a few inches in diameter up to pieces of about 1/3 cubic yard. It has been dumped by truck right at the toe and shoved into place by the bulldozer or pulled up by a dragline. About 7,000 cubic yards have been placed to date. The slope paving consists of a native granite laid by hand.

PERSONNEL

The grubbing contract was carried out by Pascal Ricci, New York City; the sheet pile cut-off by L. E. McLaughlin, Inc., New London, Conn., with B. A. Wilder as Superintendent; and the dike contract is being carried out by the R. C. Huffman Construction Co., Cleveland, Ohio, with K. A. White as Superintendent. The entire project is being carried out under the direction of Roscoe N. Clark, City Engineer, with the writer in charge of construction. Fay, Spofford & Thorndike, Boston, Mass., are the consulting engineers.

Lighting the Job for Night Dragline Work

SWINNEY & COLEMAN, contractors and engineers, Opelousas, La., whose work was described in the article "Diesel Engines on Construction Work" in the January, 1931, issue of CONTRACTORS AND ENGINEERS MONTHLY, are running day and night with their four dragline machines as usual. A recent letter from Mr. Swinney states that each of their four draglines, two Thew-Lorains, one Northwest and one Koehring, is equipped with a Class E Kohler lighting plant. As each new machine was purchased a 1,500-watt electric plant was installed, without a gas tank and with a manual starter. It cost about $5 to mount the lighting plant on the dragline, except the cost of six bulbs.

A board about 10 feet long is bolted halfway up the boom. At the two ends of this board are bolted two 50-cent aluminum dishpans, into each of which are put two 200-watt electric light bulbs. At the rear of the machine over the diesel engine two more 200-watt bulbs are fastened. It takes about 50 feet of BX electric cable to do the job. The dragline can be equipped with the lighting plant in about one hour ready to crank up.

Some of the light plants have been run for about three years. All of the maintenance which they have received has been changing the oil every Monday morning and the brushes on the generators about once a year. Oil is cheap and Swinney & Coleman believe in using it. During the winter the electric plants were running from 5 P. M. to 7 A. M. or about 14 hours out of each 24. The night shift almost invariably does more work than the day shift. They can see just as well and any little repairs are always done by the day shift so the night shift will have no hold-ups.

West Virginia Contractor

by Using an Excess of Hand Labor on a 6.8-Mile Concrete Paving Project

Relieved Local Unemployment

Fuccy Brothers of Weston, W. Va. Had 110 Laborers on Fine Grading

IN spite of the fact that the entire project had been rough graded a year or two in advance of paving, there was considerable need of re-rough grading on West Virginia Project 1560, a 6.8-mile concrete project south of Walkersville, W. Va. A Monarch 50 with a Galion 10-foot blade grader was used to get the grade into shape for the fine grading. In addition there were nearly 110 men employed on the grading operations in addition to the sixteen men who normally handled the fine grading and the ten men on form setting. There were several cuts which had to be widened and all the work was done by hand in the sandstone rock.

That this forward-looking firm of contractors may have the full credit due them for their contribution to the solution of the unemployment problem, let us quote from an editorial in the July issue of CONTRACTORS AND ENGINEERS MONTHLY.

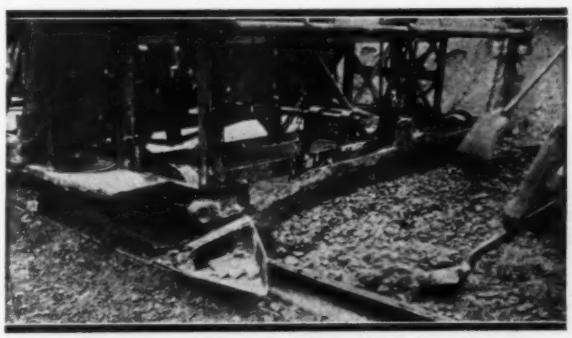
"During my southern trip in May and June, a notable example of what at least one contractor has done to help out in this crisis came forcibly to my attention. About fifty years ago the firm of Fuccy Brothers was organized in West Virginia. That notable contracting organization was responsible for a large portion of the railroad construction in that mountainous State. Their construction camps were scattered every 10 miles or so throughout the State during the height of the railroad construction era. When the full quota of railroads was completed the Fuccy brothers turned their attention to the building of highways. The original brothers died, leaving the business to the three Fuccys who are as well known in the State highway construction field as the original brothers were known in railroad construction.

"I visited their work south of Weston, their home town, and saw much of interest. But, the fact that impressed me most was the apparent over-organization as far as the number of men engaged in hand work on the fine grade was concerned. Where a labor gang of thirty-five men might be considered adequate, Fuccy Brothers was using nearly four times as many. At lunch, at the home of the postmistress of the little town where the batching plant was located, I had a long talk with the third of the brothers whom I had met on the job. I put the question to him squarely, 'Why are you using so many more men than are really necessary on the fine grade?'

"With the pleasant smile which is characteristic of the three brothers, he explained the very good and Christian reason why so many extra men were employed. Fuccy Brothers responded to the appeal of the President of the United States for industry of every kind to assist at least until May in giving employment to every man possible. Fuccy Brothers was engaged in a road building job in their own county, near their own home town. They put every able bodied man they could possibly carry onto the work and they helped in a great measure to overcome conditions that approached starvation rations for many families." And that is the reason for the large amount of hand labor on this job. What better reason could there possibly be?

FINE GRADE AND FORM SETTING

The labor organization on the fine grade was assisted by a Buffalo-Springfield 5-ton gas roller with scarifier and blade scraper which worked wonders in finishing off the grade. There were ten men in the crew which set the steel forms and they were followed up by a gang



Close-up of the Heltzel Finishing Machine in Its First Pass Over the Concrete

of twelve men on final grade, who worked with a scratchboard. Then the subgrade was finally rolled with a Monarch 10-ton roller.

Immediately ahead of the paver three men were used to realign the forms to be sure of an even grade and true line for the surface. One man was used to oil the form with a pail of oil and a brush.

Batching Plant at North End of Job

Both sand and gravel were received by hopper-bottom steel freight cars, from the New Martinsville Sand & Gravel Co., at New Martinsville, W. Va. The batcher plant was located at the town of Walkersville where the cars of aggregate were dumped as needed into one delivery pit which was carefully cleaned each time a shift was made from sand to gravel or vice versa. The aggregates were handled by an Erie steam crane with a ¼-yard Williams clamshell bucket, either to the Butler weighing batcher or to a small stockpile.

The labor organization at the batching plant consisted of four men in the cars, one crane man, one fireman, one batcherman, one foreman and two men in the cement car, tossing the 7 bags of Bessemer cement from the hand trucks onto the batches in the trucks. The individual batches contained 1,395 pounds of sand and 2,500 pounds of gravel.

A maximum of 12 trucks was used for hauling the batches to the road. These were all individually owned trucks and were paid by the batch-mile.

Good Organization for Placing the Concrete

The trucks turned through a breech in the forms and when they stopped, in the process of backing to the paver, one man climbed onto the truck and cut the bags and two men emptied the cement onto the batches. Another man tied up the bags that were tossed off the truck and returned them to the batcher plant.

Two men were used to dump the trucks, as several of the so-called "self-dumping" trucks were of a home-made variety and needed the combined strength of two husky men to start the "self" part of the dumping. One man was detailed to sprinkle the subgrade and two handled all the dirt picked up by the Heltzel subgrade planer which was attached to the Koehring 27-E paver. There were seven men in the pit shovelling and handling the hand strike-off for the placing of the National welded steel fabric. Two men shovelled to the face of the Heltzel screed.

There were two float men behind the finishing machine and just ahead of the 12-foot longitudinal float which was handled from twin bridges, spaced 14 feet apart. The next finishing operation was the belt, handled by two men and then the two edgers, two men on burlap and one man sprinkling. These men all worked under one foreman. There were five men taking up the burlap and carrying it forward for further use, applying the Grasselli silicate of soda the day following pouring of the slab, and removing and carrying forward the forms.

There was one truck called the "hurry-up wagon" which was in use all of the time carrying supplies of one kind or another to all parts of the job. Another truck was used with four men to handle the steel and distribute it on the job.

Hand Finishing with a Heltzel Belt

Good Progress Made

The organization described above started work on May 20, just seven days after the contract was awarded. On May 27, the first concrete was poured and the job completed on July 27, under a time limit which allowed the contractor until November for the completion.

Adequate Water Supply

Water was secured from the West Fork River by means of a Rex gasoline pump and delivered over the job through a 2-inch pipe with taps for the paver hose every 300 feet. The paver carried 175 feet of hose, 2 inches in diameter.

Quantities and Unit Prices

Item	Quantity	Unit Price	Total
Unclassified excavation	18,000 cubic yards	.40	$ 7,200.00
Dry excavation	200 cubic yards	1.00	200.00
Class A concrete	10 cubic yards	15.00	150.00
Class B concrete	40 cubic yards	13.00	520.00
Reinforcing steel	500 pounds	.05	25.00
18-inch reinforced concrete pipe	100 linear feet	1.75	175.00
24-inch reinforced concrete pipe	20 linear feet	3.50	70.00
8-inch perforated corrugated metal pipe	100 linear feet	1.00	100.00
Cement concrete pavement	14,100 cubic yards	10.90	152,690.00
Metal rein. for pavement	280,650 pounds	.0425	11,927.62
Premoulded expansion joint	4,160 linear feet	.10	416.00
Project marker	1	25.00	25.00
			$174,498.62

Personnel

This project was constructed by Fuccy Brothers Construction Co., with L. J. Fuccy, R. J. Fuccy and S. J. Fuccy in charge of grading, concreting and the batching plant. For the Road Commission of West Virginia, the work was in charge of C. R. Duncan, Senior Assistant Engineer with H. G. Everly as Inspector in charge and Randolph Holbert as Inspector.

Blasting Mats Used in City Operations

EXTREME precautions are taken during blasting operations in cities where explosives are required for subway work and for excavating through rock in making deep trenches for sewers or other construction.

One of the adjuncts to blasting in cities is the so-called blasting mat which consists of woven cable wire three-quarters of an inch in diameter, fabricated to provide mats of from 18 to 20 feet square. These mats are placed in position over the rock to be blasted, after the holes have been drilled and loaded and are ready for the shooting. Because of their weight, it is necessary to use small derricks when lowering or raising the mats.

Cableway Handles All Material *for* 288-Foot Concrete Arch Bridge

Side View of the Henry Street Bridge Showing the Structural Steel Falsework

By
Thos. H. Wittkorn

THE use of fabricated steel falsework, as high as the average 12-story building, and the movement of all material downward from a cable line, are two unusual features in the construction of the Henry Avenue Bridge over the Wissahickon gorge in Fairmount Park, Philadelphia. It will cost approximately $1,700,000, and is just one link in a comprehensive highway development plan now being undertaken by the city, to give a new traffic outlet to a large section which has been dependent heretofore on one artery.

The main arch has a span of 288 feet with a 99-foot rise and it will carry a 60-foot roadway and two 12-foot footwalks, 155 feet above the water of the creek it crosses. Provision is also made for it to carry eventually a two-track high-speed transit line. Its full length will be a little over 900 feet and besides the arch will be supported by 13 pairs of concrete and stone-faced piers.

No Hauling Permitted in Park

When the contractors began estimating on the costs and ways of building this bridge they found themselves facing the fact that the authorities would not allow them to use the Park drives for hauling of any kind. The sides of the gorge were too steep to take material up and down successfully, and most contractors saw only the erection of a falsework all the way across the gorge so passed up the job. Canuso & Sons, a Philadelphia firm, believed that it could be built from an overhead cable and were successful in getting the contract to do the work.

S. Flory Mfg. Co., Bangor, Penna., built the overhead line which stretches 1,100 feet between two 110-foot high wooden towers. The weight is carried by a 2½-inch plow steel cable which has a sag of 55 feet. They also built the carriage with 30 trolleys which will carry 15 tons. It is operated by ¾-inch steel cables on 4-foot drums and with a 150-hosepower electric motor. All construction work depends on this cable line for supplies and so far there has not been a shutdown on account of its failure.

Loads Out-of-Sight Handled Easily

During the early stages difficulty was encountered in getting a man who could successfully operate the outfit with speed and accuracy, as most of it is blind work, but since it has been run by George W. Hughes, who has had much experience on Panama and barge canal work, things have been progressing with complete satisfaction. By a system of cable guides hanging over the drum he can run a load to within 2 feet of its destination and then Western Electric telephone equipment enables the man on the spot to tell him what is wanted to make the landing perfect.

Falsework Used Twice

The bridge is being built in two ribs so that the falsework for the main arch, which was made by Beth-

lehem, is in one section and will be moved 55 feet and used for the second arch. For this reason it was fabricated on steel tracks and rests on twelve wedge jacks which will allow the whole form to drop 9 inches when they are opened. Six points have been provided for the attachment of steel cables and it is planned to have motor trucks with winches move this gigantic form when the proper time comes.

As may be seen from the photograph, the top of this steel work was overlaid with timbers and a wood form for the concrete.

Wooden forms are being used, but wherever possible the face stone, which varies from 1 to 4 feet thick, is being placed first and then used as the outside form. The inside forms are braced with wires from the outside stonework.

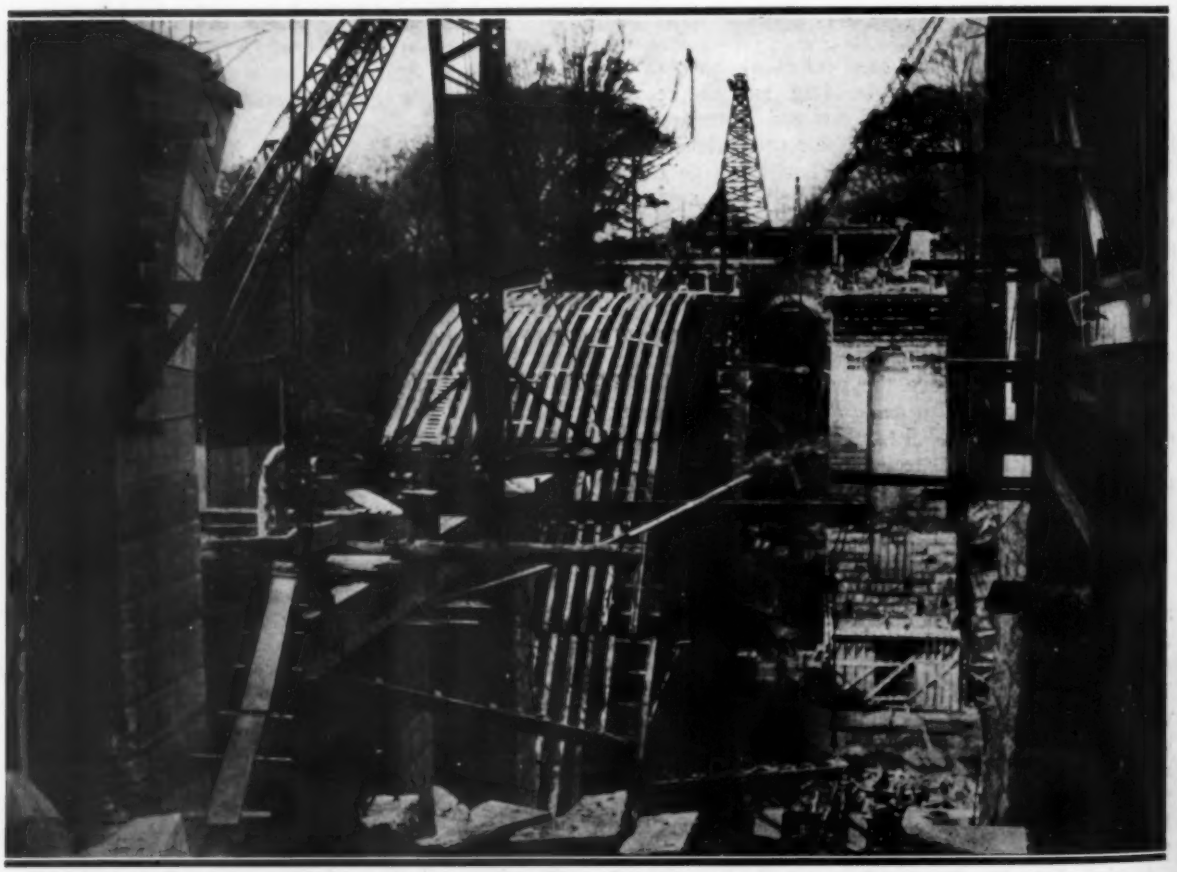
CONCRETING PLANT AND POURING

The concrete is made in a Ransome 27-E 1-yard mixer which is located nearly under the cable line at one end of the bridge. The Mack trucks dump the batches of gravel and sand into it while two men add the required amount of cement. In a pit below the discharging end of the mixer are two 3-yard buckets which were especially built for this job by the Union Iron Works, Hoboken, N. J. A swinging chute allows the man at this end to fill either bucket and when one is ready it is taken by the cable line to the forms.

Two different mixes are being used, depending on where it is being placed. One after 28 days must test 2,000 pounds and the other must be good for 2,500 pounds. In the middle of January an average of 200 yards of concrete was placed in a day although earlier in the season 275 were handled. No quick setting material was added but tarpaulins and steam from a 230-horsepower boiler at each end of the bridge were used to combat the weather.

When pouring the first sections of the roadway on each end of the bridge, 3-yard wooden hoppers were used and the buckets from the cable line were dumped into them while men with Georgia buggies wheeled the concrete to the place needed. Water for the work comes through a 2-inch pipe which has been laid 3 feet underground for a distance of half a mile from the city water main.

Work was temporarily halted the latter part of January, due to the buckling of a gusset plate on the steel falsework supporting forms for the first arch ring which caused a settlement of approximately 3 inches at the crown of the arch. As a measure of safety, workmen were withdrawn from the span and traffic using the park drive underneath the bridge was stopped. A number of the arch segments had already been paved at the time of the accident but none of the key blocks. It is believed that foundation settlement caused excessive stress of the steel falsework, resulting in the failure of the gusset plate.



Main Arch of the Henry Avenue Bridge Showing the Manner of Starting the Floor System. Note the Two Ribs. The Falsework Will Be Moved 55 Feet Laterally to Care for the Forms for the Second Rib at the Right

Large Blocks of Face Stone Being Moved by a Mack Truck from the Freight Yard to the Bridge

MATERIAL HANDLING FROM FREIGHT YARD

All material for the bridge is arriving by freight at the Wissahickon station of the Reading Railroad, about a mile and a half from the job, and is then transported up a long but well-paved hill by a fleet of ten Mack trucks owned by the contractor. A Blaw-Knox 100-ton batcher plant has been erected at the freight yard and the concrete aggregate is proportioned there. During the freezing weather three layers of 2-inch steam pipes were installed in each side of the batcher and steam at 125 pounds pressure was supplied by the boiler on a Keystone grader. A Northwest gasoline-operated crane mounted on a crawler track used a clamshell bucket to unload the cars direct into the hoppers or storage bins as needed.

The face stone, 206,000 cubic feet of it, was received by freight at the same place from a sandstone quarry at Curwensville, in western Pennsylvania, and was hauled by the trucks to the bridge. It was all cut and fitted at the quarry so unless there was a delay of some kind it was moved direct from the freight yard to its permanent location. The cable line moved the stone onto the bridge but it was placed by two Mundy 7-ton derricks which were electrically operated.

Other pieces of equipment which have been used in various stages of the work are two Ingersoll-Rand compressors, a Fordson scraper, a Wehr one-man power grader, a Buffalo-Springfield gas roller and a Caterpillar Sixty tractor which was used to drag heavy material to the cable line.

PERSONNEL

Plans for the Henry Avenue Bridge were drawn by Modjeski & Chase for the Philadelphia Bureau of Engineering and Surveys, and at the time it was the largest of its kind in the world but it has since lost that standing. Work on its construction at the middle of January was far ahead of schedule on account of the favorable summer, only five days having been lost on account of rain. The mild open winter was a great help also.

Besides those already mentioned in the article the following are engaged in its construction: Charles E. Modjeski, Resident Engineer; G. S. Webster, Consulting Engineer; Paul Cret, Consulting Architect; Francis A. Canuso, head of the firm of Canuso & Sons and his two sons, Francis A. Jr., and Victor, who are directing the work. Charles E. Cornell erected the falsework.

Cutting a Curb and Gutter Trench Through 36 Inches of Limestone

IN digging the trench for curb and gutter forms for approximately 5 miles of paving in Lyons, Ill., through limestone rock, Albin Carlson & Co., contractor, Chicago, Ill., used a trenching machine which had already saved approximately $18,700 in 200 working days. This trench was 32 inches wide and from 12 to 36 inches deep. The rock through which the ditcher worked was part backfill packed rock which had to be broken and brought up by the buckets.

Along with this paving job in Lyons a gas and sewer trench was cut. An air compressor and twelve men with rock hammers cut the gas trench and dynamite was found necessary to break up the trench for the sewer. The ditcher cut to a depth of 36 inches at a rate of 5 feet per minute, cutting about 800 feet in an average day. According to the contractor it is doing work on this job which would require forty men. The machine operates about 10 hours per day.

A good part of the efficiency and economy of this ditcher as a digging tool may be attributed to the intelligent care and operation that it receives. A capable and intelligent operator is provided and minor adjustments are made from time to time to keep the machine operating as smoothly as possible. The cost of ditching with this machine is only 2½ cents per foot as against 7 cents per foot when digging with hand labor. The following cost figures covering the operation of the ditcher were supplied by the contractor, covering 200 days operation:

Operator at $16.50 per 8-hour day	$3,300.00
Two men to string grade lines at $7.80 per day	3,120.00
Gas and oil (15 gallons of gas and 1 quart of oil daily)	620.00
Repairs	534.12
Depreciation (over a period of three years)	3,843.32
Interest	230.00
	$11,647.44

The total cost of $11,647.44 divided by 450,000 feet of trench dug, gives a cost of $0.025883 per foot.

The scale for labor in the territory in which Albin Carlson & Co., operates is 97.5 cents per hour. About 20 men would be required to do the work done by the ditcher or 20 times 79.2 times 8 equals $156, the cost of a labor gang for one day. This sum, multiplied by 200 the number of days the ditcher was in operation equals $31,200 which, divided by 450,000 equals $0.06933 per foot, the cost of digging by hand.

Although for the purposes of figuring depreciation, the life of a ditcher is arbitrarily set by the manufacturer at 5 years, depreciation on this particular machine was figured over a lifetime of only 3 years because of the hard service it has seen. A. Carlson & Co. has three of these Barber-Greene ditchers in operation, one since March, 1926, which is working on a paving job near Westchester, Ill.

Cutting the Trench, Showing the Character of the Stone Encountered

Construction

of Saw-Tooth-Roof Concrete Building

Rapidly Followed

Speedy Work of

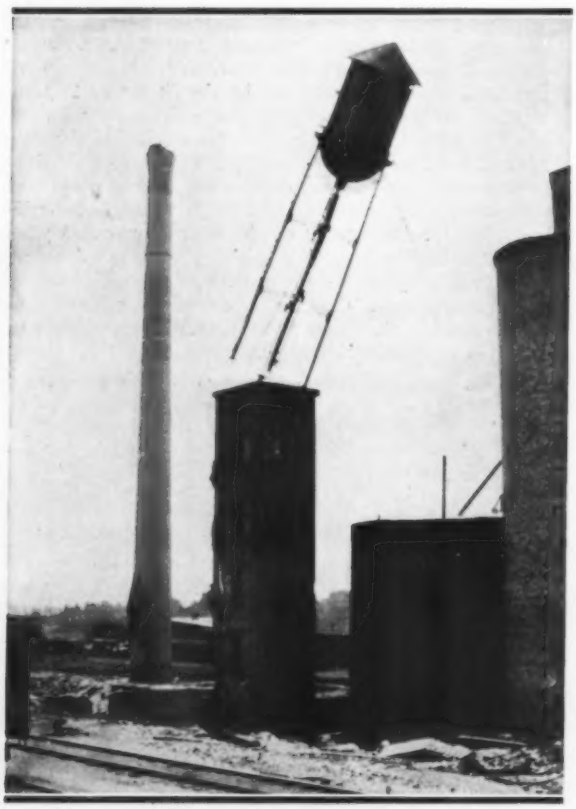
Demolition

By
H. H. Tompkins

Superintendent of Construction

American Can Co.

Terre Haute, Ind.



Pulling Over the Sprinkler Tank

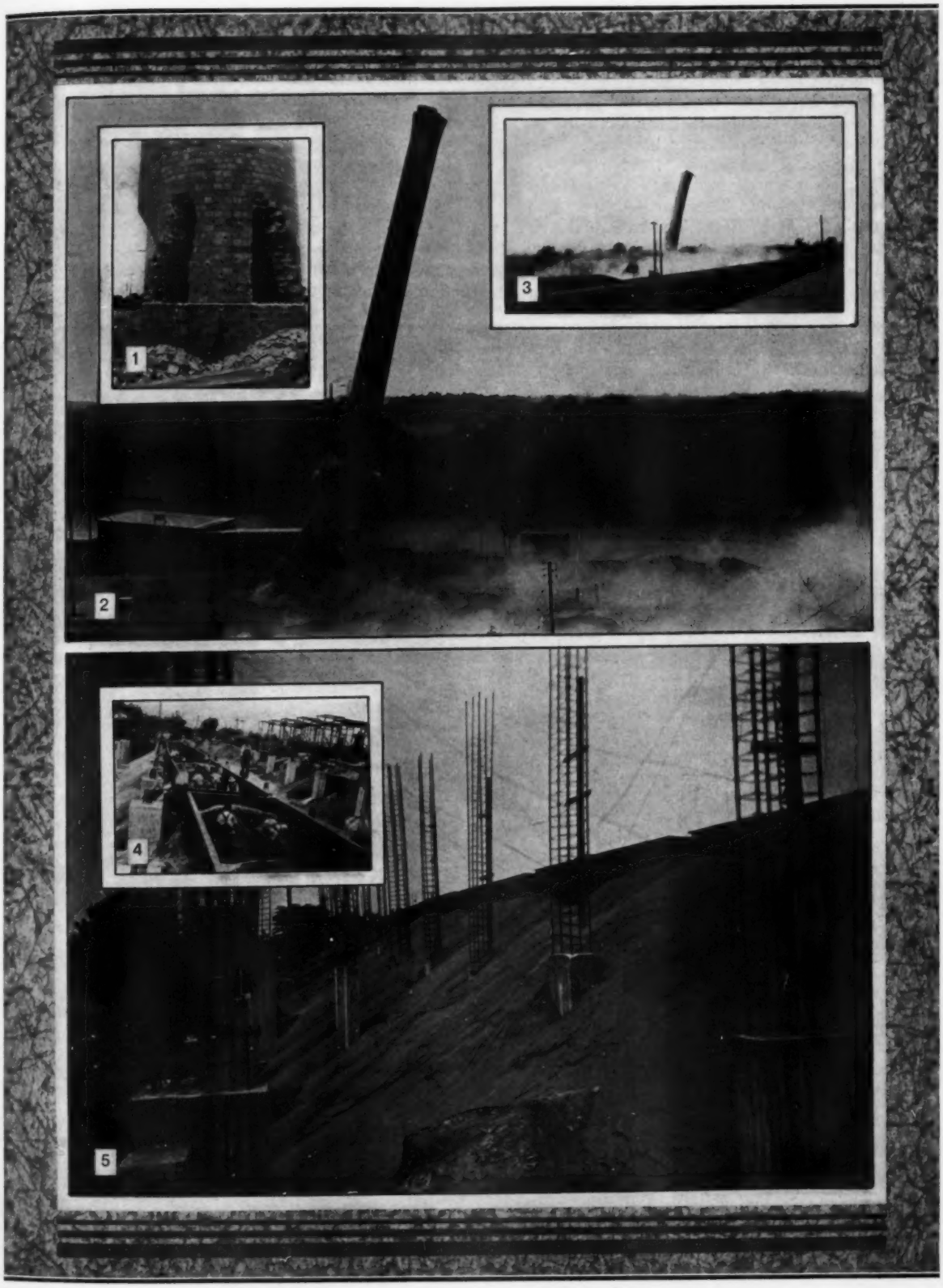
THE construction of a new factory unit for the American Can Co., at Terre Haute, Ind., involved some interesting work in the demolition of the old American Hominy Co.'s plant on the site of the new structure, as well as interesting plant layout and methods of construction on the new buildings. The old plant consisted of the remains of brick walls, some five stories high, six grain silos about 100 feet high, a complete elevator shaft and head house, a sprinkler tank on a brick shaft, a reinforced concrete corn dryer, approximately 20 x 30 x 100 feet, and a 150-foot smokestack located at about the center of the plot.

Wrecking Operations

The wrecking of the American Hominy Co. plant was done by the Construction Department of the American Can Co., with the assistance of Messrs. Dicks, Colcloser and Bearfield, du Pont technical representatives as consultants, and W. D. Dewar as powder foreman for the owners. The high brick walls were blasted by drilling into the concrete foundations half way, zigzagging the holes and using half sticks of 30 per cent dynamite. The low brick walls were pushed over with track jacks and timber.

Wrecking the Corn Dryer and the Silos

In wrecking the corn dryer the east and west walls were first blown out. Then a steel H-section column which supported the interior of the dryer was needled with 8 x 8-inch timber and a 2-foot section burned out. The north wall was drilled through, the holes being zigzagged for the full width of the wall and over a height of 8 feet. A chase or groove was cut about 30 inches above the ground on the outside of the south side. After the holes were bored and loaded the vertical reinforcing rods in the chase were burned off before exploding the charge. The fall was practically perfect, all of the debris landing within 6 inches of where it was figured it would fall. The impact with the ground was so great that the top of the corn dryer went 18 inches into the ground. The concrete wall



DEMOLISHING THE OLD STACK AND STARTING CONSTRUCTION

1. *Section of the tile cut away at the base of the stack and remaining sections drilled for explosives.* 2. *The stack on the way down showing the first break.* 3. *The upper section which fell vertically, breaking a second time and the top starting to fall over.* 4. *and* 5. *Bringing in the fill on temporary tracks.*

collapsed, except for a section about 20 feet long which remained intact.

The wrecking of the first two silos was very interesting indeed, owing to the way in which the reinforcing bands, brick ties and mortar supported the upper parts of the silos after the bottoms had been dropped. A little difficulty was expected in blowing out the lower section because of the nature of the material. Holes were drilled between the two north silos and the center silos from the outside. These were then shot to break the bond between the silos. The base of the silos was then drilled, loaded and shot, then reloaded and shot, leaving the left hand silos hanging in the air and rather dangerous to get at. Following this, the work was started from the top, hanging the dynamite on sash cords on opposite sides of the space inside where the four silos were connected. The result of the first shot by this method is shown in the third picture of the first group of five. The second shot by the sash cord method using 72 sticks of dynamite on 6 sash cords, 3 to a side and 12 sticks to each cord, brought down the balance of these two silos and the head house, the structural steel members of which had been previously burned out.

On the second two silos the first shot was fired between the pairs of silos in two rows. Then the bottoms were blown out as shown in the fourth illustration in the first group. These two silos were then

DEMOLISHING THE GROUP OF SILOS

1. The north pair of silos after the first charge was exploded to remove the base. 2. Condition of the same pair of silos after the base was reloaded and shot. 3. Upper sections of the silos after the explosion of charges hung by sash cords inside, where the four silos connected. 4. Result of the first two sets of shots on the second pair of silos. 5. The second pair of silos falling.

ERECTION OF FORMS FOR THE REINFORCED CONCRETE SAW-TOOTH ROOF

1. Forms completed for the horizontal beams, the first operation in this type of construction. 2. The horizontal beams stripped and forms in place for the saw-tooth column and beam. 3. Forms for the saw-tooth column, girder, beams and back of the curtain wall. 4. Method of supporting the lower ends of the intermediate beams. 5. Forms for the girders at the columns, beams and nailers.

brought down by the sash cord method. The last photograph of the group shows the last two silos falling and was taken when the silos were at an angle of about 45 degrees falling away from the camera.

WRECKING THE SPRINKLER TANK AND STACK

To dismantle the sprinkler tank, a 2-inch rope was made fast above the platform on the tank and left hanging down close into the tank and shaft. The anchor bolts were burned off above the bearing plates on the falling side and below the bearing plates on the far side. The 2-inch rope was then carried forward and tied to a Caterpillar 10-ton tractor which pulled the tank over as shown in the illustration. The sprinkler shaft was dynamited, crumbling down vertically, although the shots were loaded on one side only. This was probably caused by cracks from the lintels to the sills of the doors and windows continuing the entire height of the structure on two faces, the result of a fire which destroyed the old mill buildings.

The stack was wrecked by first filling in the breeching openings with brick, using mortar and then cutting away the stack at the base in sections, as illustrated. It was necessary to put a needle under the breeching as cracks opened. The chimney tile and the needle were blown out at the same time. This stack had been hit twice by lightning and was cracked vertically inside. The inside cracks were plainly visible and the outside cracks could be traced if looked for carefully. When the stack was dropped, it leaned and broke first about two-fifths of the distance from the bottom and then came down practically vertically, hitting and breaking at a higher point and then falling over. The two breaks are shown in the illustrations.

The dropping of the chimney completed the wrecking above ground, one month and a day from the time demolition was started. In the construction of the foundation for the new building a few piers had to be put through parts of the old walls and foundations, but no difficulty was encountered. There were no serious accidents or property damage during the wrecking of the structure.

EXCAVATION AND FOUNDATION WORK

The excavation and pouring of footings, pedestals and columns was carried on while wrecking was in progress and was made ready for the fill to be put in. Temporary railroad tracks were laid and fill brought in at the rate of 24 to 32 carloads a day to fill in to a level high enough to allow setting of the second floor

forms, the first floor being laid directly on the fill. The tracks were jacked up at night.

From the middle of August work on the concrete structure itself progressed very rapidly indeed. On October 1, 1930, forms for the pouring of the reinforced concrete saw-tooth roof over the 3-story structure was in progress. A group of photographs is reproduced showing details of the form work.

PLANT EQUIPMENT

The equipment used on the job included one sand bucket elevator, and a stone bucket elevator, a corn crib type bin for the stone, a ¾-yard Rex mixer, Blaw-Knox volume batchers and a Lakewood concrete bucket operating in a wood tower. All of the concrete was buggied except for some footings on a slope which were poured through coal chutes direct from a Koehring 7-S Dandie mixer.

The structures included a 3-story service building, 50 x 92 feet, with locker rooms on the first floor, a lunch room on the second floor and offices on the third floor; a 3-story factory, 163 x 338 feet with wood block floor for the first and third stories and a cement floor on the second story; a one-story 144 x 198-foot structural steel shipping shed; and boiler room 90 x 90 feet, one story high and L-shaped with a 150-foot stack and a 24 x 58-foot brick coal silo. The buildings were far enough advanced by November 1, 1930, that the installation of machinery was started at that time.

PERSONNEL

Both demolition of the old structures and construction of the new were handled by the Construction Division of the American Can Co., with the author as Superintendent, A. W. Cordes, Assistant Superintendent, and R. J. Kadow, Job Engineer.

How 31 Rock Tunnels Were Driven

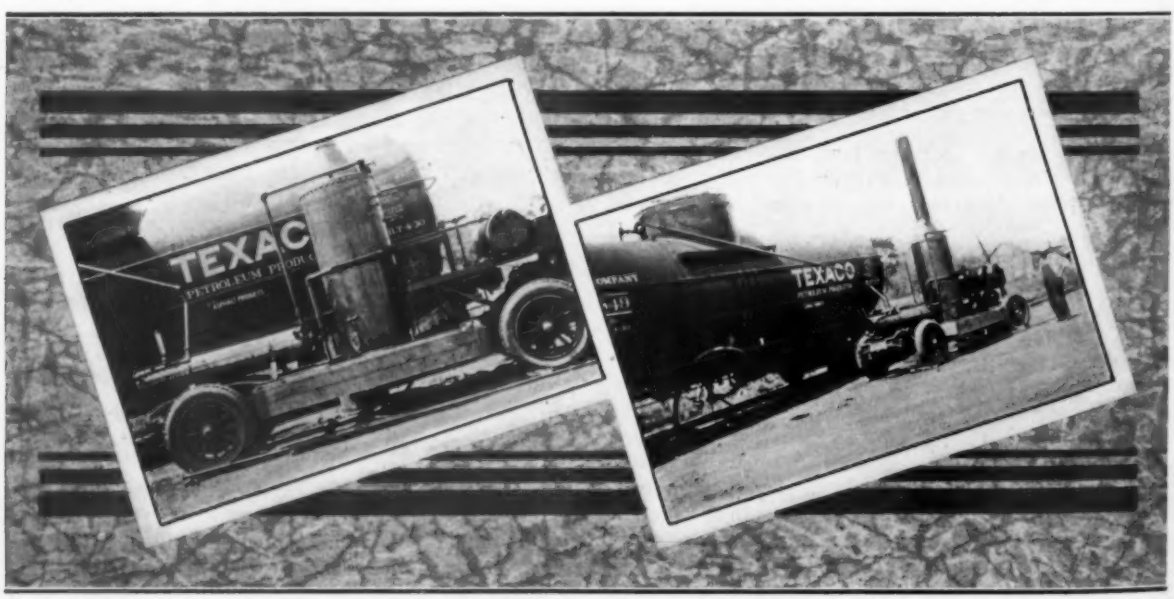
SUMMARIZING the experience of a large number of leading tunnel builders, a volume, entitled "Rock Tunnel Methods" containing a symposium of tunnel methods compiled by Theodore Marvin, Editor, *The Explosives Engineer*, assisted by Douglas C. Corner, President, St. Louis Power Shovel Co., has been published by the Hercules Powder Co., Wilmington, Del.

This volume covers the drilling, blasting, excavating, transportation and ventilation methods in 31 important tunnels located in the United States and other countries. Certain data on tunnel lining also have been included. Among the tunnels described are the Boston Water Supply Tunnel, Moffat Tunnel, Coast Range Hetch Hetchy Tunnel, the new Cascade Tunnel, the Owyhee Tunnel, St. Paul Pass Tunnel and the Shimizu Tunnel, Japan. The tunnels described are for railroad, mine, water supply and hydro-electric purposes. The volume is well indexed and provides easy access to any form of data on tunnel building.

"Drilling and Blasting in Some American Metal Mines" by the same author, has found a wide demand among tunnel contractors and engineers and can be used to advantage in conjunction with "Rock Tunnel Methods." Both books can be obtained at no cost by writing to the Hercules Powder Co., Wilmington, Del.

A Home-Made Superheater for Unloading Asphalt Tank Cars

THE Lansdell Co., highway contractor, of Hackensack, N. J., has built a home-made superheater for unloading asphalt from tank cars. A fuel oil burner is rigged up at the fire box door of a vertical boiler. Steam is taken from the top of the boiler and passed through a coil placed horizontally at the rear of the truck. Here another fuel oil flame passes inside of the coil. This flame, which acts as a superheater, raises the temperature of the steam to about 700 degrees Fahrenheit, at which temperature the steam passes into the coils and to the tank car. Condensed steam from the bottom of the tank is then returned to a small pump which forces it back into the boiler. The superheater saves both water and fuel. One barrel of kerosene is more than sufficient to heat one tank car of asphalt at normal summer temperature.



Two Views of the Lansdell Company's Superheater

Misappropriation?

The Contractor *as a* Trustee *of* Borrowed Funds

By

J. E. Gregory, C. P. A.

Farrington, Hyland & Gregory
Certified Public Accountants
New York City

This is one of a series of twelve articles appearing monthly during 1931 *covering tax, accounting and system problems as applicable to the contractor.*

Particular problems relative to either accounting, systematization or tax matters may be directed to the offices of Farrington, Hyland & Gregory, Certified Public Accountants, Chrysler Building, New York City, or to CONTRACTORS AND ENGINEERS MONTHLY, 470 *Fourth Avenue, New York City.*

SUFFICIENT emphasis has not been laid upon the responsibility of the contractor to those who assist in financing him, his banks, material creditors and subcontractors. Too often it happens that funds derived from the contractor's first group of requisitions are utilized for personal matters, leaving outstanding as the jobs progress a continually increasing obligation due to banks or material creditors, so that when and as the final requisition has been realized and expended there still remain outstanding obligations upon a job that produces no further cash revenue.

Losses on jobs, of course, produce this result, but the condition explained has been in a large majority of cases caused by just this procedure of faulty trusteeship.

An Example

The following narrative is typical: Contractor James, who had for years worked as an employee for Contractor Smith, decided to engage in business himself. Accordingly he incorporated the James Contracting Corp. and invested $10,000.00. Within a few months he was a successful bidder in the matter of a large school construction job. His bid was a fair price and under reasonably favorable circumstances he should have profited by some $30,000.00. The total contract equalled $462,500.00. There, of course, were possible extras.

With the contract in hand and a matter of some $5,000.00 on deposit, James approached his bank with a request that they assist him to finance the job. The bank was in accord and willingly granted him credit to the extent of $30,000.00.

The work progressed to the point of the first three requisitions during which time Contractor James received on architect's approval a matter of $237,000.00. He paid many of his subcontractors in part, made payments on account to his material creditors as they requested payment, kept a cash balance of some $50,000.00 and purchased for himself a new high priced sedan, a parcel of real estate, paid $10,000.00 into the stock market, and all of this in the thought that it was a perfectly proper procedure. His accounting records were haphazard and he failed to see the day of reckoning. There is no doubt but that out of part of his cash receipts he was entitled to reasonable remuneration. He had been earning $100.00 per week before entering business for himself. His drawings immediately became a matter of $500.00 per week. Well, the story is sad, but typical. He was able to complete the job by stalling his material creditors and subcontractors. His only salvation was in obtaining another contract immediately, in order that with the proceeds of his initial requisitions on his new job he could in part, and possibly in whole, clean up his debts as applying to his first job.

With the completion of his first contract and the sending of his initial requisition on his second job, although he was unaware of the actual figures, his status was thus: His cash account was $32,000.00. His bank

loan was $30,000.00. His jobs were as follows:

Job	Total	Requisitioned	Received	Due	Costs	Owing Creditors	Profit
Contract No. 1.	$462,500	$462,500	$462,500	.....	$431,500	$75,000	$31,000
Contract No. 2.	300,000	50,000	.....	$45,000	38,000	14,000	.....

It is apparent that after paying his bank he had but $47,000.00 available to meet $89,000.00 in obligations that were due, $75,000.00 that were pressing upon a completed job.

Lack of an appreciation of his position as trustee covering the funds received for the benefit of those participating in its obtaining, resulted eventually in his inability to obtain further credit and after a period of some four years his business, founded not on a lack of faith but rather on a lack of business sense, became a matter of receivership liquidation.

Was he to blame? Had he the right to be in business? Had he not misappropriated funds? Had he not violated his trusteeship?

For three years he was pointed to as being an outstanding success, even by his bankers, who like himself did not know the facts. He learned the error of his ways under the scrutinizing cross-examination of the lawyer for the creditor's committee. Today he is working for Contractor Smith and wonders how Smith avoids his errors.

This is not a pleasant story but it is only too true of many good hearted fellows today who lack a sense of direction when it comes to financing.

How Did Smith Avoid Misappropriation

Smith has been in business a matter of ten years and will probably be in business until he retires. His abilities and business sense were no different from James' when he started, except that he started right.

He took his banker into his confidence, conferred with him and solicited his advice. His banker insisted that he keep a complete set of accounting records that would give him the facts, and then went over these facts at regular intervals with him. Regularly Smith informed his creditors and subcontractors of the status of their account as compared with the future job receipts to which their account applied. They knew when they could expect payment, and if they did not receive it on the stated day, they knew why.

In actuality, he sensed, through the advice of his banker, that he was after all to a great extent handling funds that belonged to others, and realized that they had a right to receive regular accountings of that stewardship.

Today, despite a lack of great personality, Smith is one of the biggest men in the community, a five foot-six bundle of community faith, director in three banks and a leading influence in a dozen other organizations. There was no luck attendant upon his success, merely a trustfulness in the faith of others, and a willingness to be directed by those who reposed faith in him.

If you ask him how he has achieved his accomplishments he will blandly tell you that he renders his decisions only on the basis of all known facts. His early achievements and latent successes in business, he concedes were due to a complete knowledge of the financial facts as applying to his business, giving credit to his banker and his accountant, and of course to his lawyer.

Welding Brings in New Hazards

ACCORDING to a report from the Construction Section of the National Safety Council, it is evident that the electric welding of steel structures has not taken all of the hazard out of steel erection. We have learned of a man who was put "on the spot" by either 440 or 220 volts A. C. primary motor generator current or from the welding current.

A rather serious hazard on another construction job has just come to our attention. The steel work on the new section of a building was being largely welded with electric torches. When the electrodes became too short the worker knocked them out of the instrument and simply let them fall to the ground. These electrodes are very hot and several fires were started when they fell into combustible material. It appears, however, that the real hazard is in the possibility of these electrodes, which are about 5 inches long, falling on those below.

Opening Up a Road in Brush Country in the Province of New Brunswick. F. W. Smith, Equipment Distributor of Moncton, New Brunswick, Who Sold This Bully Gear-Operated Bulldozer Made by Niess & Co., Inc., Minneapolis, Minn., Reports That Birch Trees Up to a Diameter of Nine Inches Were Pushed Over With This Monarch 75 Tractor and Bulldozer. The Work of Clearing the Road Was Less Than One-Fifth the Estimated Cost, as It Had Been Planned to Handle the Clearing by Teams and Hand Labor

Top-Soil Road Construction

in

North Carolina

A Type of Highway That Serves Well Until Traffic Demands Hard Surface

The Lorain 75A Which Handled Most of the Excavation from 11-Foot Cuts to Skimming the Grade and Shallow 2-Foot Cuts Loading to Trucks, 6-Yard Dump Wagons and Mule Teams

THE State of North Carolina, which was the first of the southern states to begin an intensive road construction program ten years ago, has not neglected the secondary roads which do not warrant the higher types of paving. The top-soil road has been developed to a high degree of efficiency and, except for its dusty character in dry weather, offers an easy riding surface for all speeds within the legal speed limit of 45 miles an hour. These top-soil roads have been the foundation of the feeder system for the heavy traffic roads and will in time be paved as the traffic needs develop.

A Typical Well-Equipped Top-Soil Job

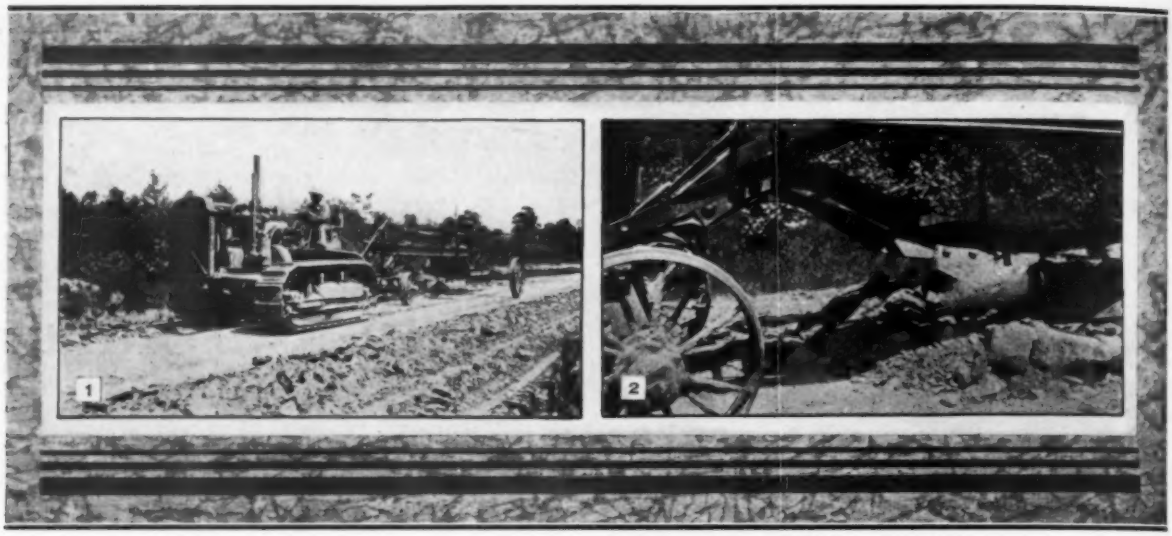
A contract for a 12.1-mile stretch of top-soil road 35 feet wide in cuts and 30 feet wide on fills was awarded in October, 1929, to Hanford Brothers of Burlington, N. C. The work was located on State Route 93 in Alamance County, south of Graham and southeast of Greensboro. As winter was approaching and any work on existing roads would tend to make them impassable during the alternate freezing and thawing of the colder months work was started at about the middle of the job where the major part of the relocation was centered. Fully 60 per cent of the job was on relocation which eliminated many old curves and grades. In the preliminary work wherever the old road was reached the contractor moved on to the next new right of way and started again.

The total excavation for the grading amounted to 180,000 yards which included the top-soiling. The amount of borrow was 10,280 cubic yards. The unit prices for the work were 27 cents for excavation and borrow and 50 cents for rock. There was considerable out-cropping of rock on the project. The contract called for the completion of the job in 125 working days but there was a slight over-run in the time required. The work was completed July 10, 1930.

A Minimum of Hand Labor Used

In accordance with the spirit of the times machines were employed to the maximum in the handling of this work. The total labor for this 12.1-mile job was only 14 men who boarded in the nearby towns. Where small quantities of earth were to be moved short distances Western wheeled scrapers were used but most of the excavation was handled by the Thew-Lorain 75A, even when it was only skimming the subgrade and making cuts as shallow as 2 feet. The average cut on the work was about 4 feet with a maximum of 11 feet and the average fills were 3 feet deep with a maximum of 14 feet at the Cane Creek bridge.

The Old and the New Cane Creek Bridges on North Carolina Route 93 in Alamance County



BREAKING UP THE OLD ROAD PREPARATORY TO NEW TOP-SOIL CONSTRUCTION

1. A Caterpillar Sixty pulling a Stockland No. 12 grader with a heavy bar scarifier. 2. A closeup of the scarifier showing the character of the hard compacted surface of the old road.

Hauling equipment for the job consisted of 5 International trucks equipped with Superior self-dumping bodies, 2 LaPlant-Choate 6-yard dump wagons, and 2 Watson 2-up dump wagons. Experience showed that the trucks and bodies were too light to use under the 1¼-yard bucket of the Lorain but the 6-yard wagons were most suitable for this work. They were used particularly for the longer hauls on fills, and were used, too, behind one of the three Caterpillar Sixties that were busy at all times. The average haul on grading was about 600 feet. One of the tractors was equipped with a LaPlant-Choate bulldozer which was used to smooth off the fills and also to even off the sections where the shovel had completed its excavation.

The final grading for the work was handled with a Stockland No. 12 and an Adams grader with 12-foot blade. The Stockland was also equipped with a heavy bar and scarifier which was used on the old road sections to break up the top foot of compacted surface to secure a better bonding with the new fill. The specifications require this on all fills of one foot or more.

Rock Work

The rock excavation ran higher than anticipated on this job but the contractor was equipped to move it rapidly. He had one Ingersoll-Rand portable compressor with a single jackhammer which was quickly moved from one outcrop to the next to drill the holes for the blasting. Du Pont 40 per cent gelatine dynamite was used to break up the rock for easy handling.

Top-Soiling Operations

As is the case in city work where condemnation proceedings are necessary to secure the right of way for improvements, it was necessary for the contractor and the state's engineers to keep the location of the borrow pits for the top soil "under their hats" else the possible crops that might have been harvested from the particular location would have been fabulous, at least in the minds of the owners. By keeping the locations a secret until the last minute the vast amount of local speculation and gossip was allayed and very few difficulties encountered.

For handling the top-soil stripping the contractor hired a Russell elevating grader to load his own International trucks. The work went forward with unusual speed at this point of the operations.

Ditches

The installation of culverts, the Cane Creek bridge and pipes were handled under a separate contract and completed before the work described was under way.

The final operation was the cleaning of the ditches by the use of a ditcher and back sloper on the Adams grader pulled by one of the Caterpillar tractors.

Personnel

The work was in charge of J. W. Hanford for the contractor, Hanford Brothers, of Burlington, N. C. For the State Highway Department W. D. White was Resident Engineer, and G. E. Hoover, Jr., Inspector.

The Value of Reinforcement in Concrete Roads

CRACKING is the measure of the life of a pavement and and without cracks the road would no doubt last many times longer. Reinforcement and particularly wire fabric reinforcement reduces cracking and holds to microscopic or small dimensions those cracks that may appear. Might it not pay to reinforce all concrete roads, especially when the 40 to 50 per cent increased useful life is considered?

Under conditions such as unfavorable subgrades, unfavorable aggregate, roads over cuts and fills and roads for extremely heavy traffic, it is generally conceded that reinforcement should be used. But that is not all. Reinforcement increases the life of all roads, whether built under the best conditions or under the worst conditions. The additional first cost is comparatively small.

The many engineers that have specified reinforcement for any length of time for all jobs, unhesitatingly continue to do so. They do this because from actual experience they find that it pays to such an extent that they cannot afford to omit reinforcement from any of their specifications.

Winter Construction of a Low Head Automatic Hydro-Electric Plant

By
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and

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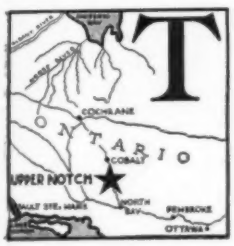
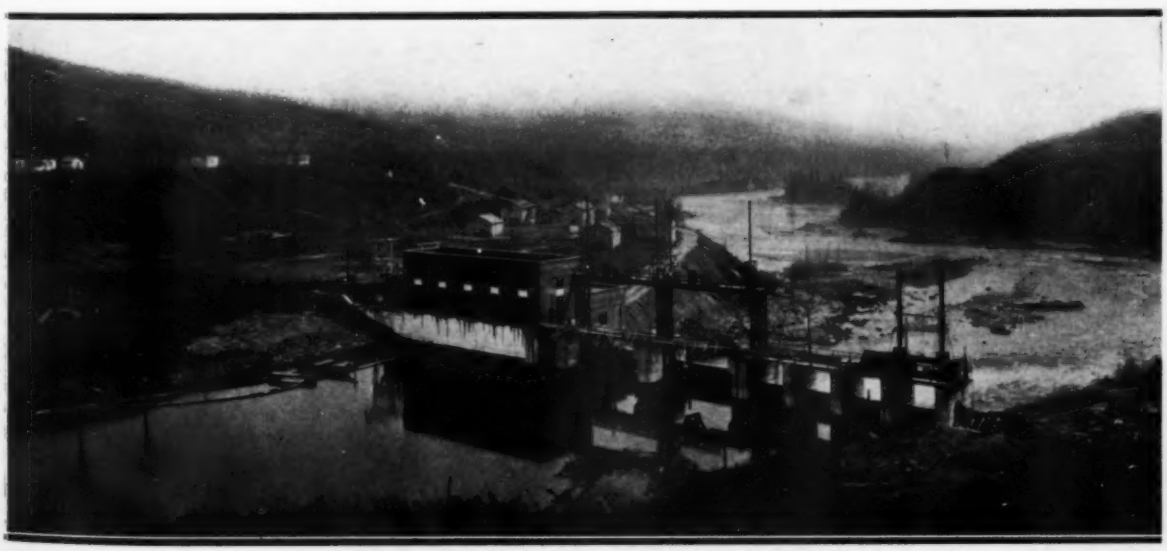


THE Upper Notch hydro-electric station on the Montreal River of northern Ontario, a feeder of the Ottawa River, has been an interesting piece of winter construction. The plant now forms part of the Canada Northern Power Corp.'s system, which serves the precious metal mining areas in the northeastern part of Ontario, and the adjoining area in the province of Quebec. The power house contains two 6,500-horsepower units operating at a 48-foot head, generating power at 25 cycles and 11,000 volts. This is transmitted to the C. N. P. C. system over a new 33-mile transmission line at 110,000 volts, the step-up transformers being single phase, water-cooled, and of 4,500-kva capacity, outdoor type.

The station is designed for remote control at a later date when the fall between the Upper Notch and Lake Temiskaming, 153 feet, is harnessed at the mouth of the river. The equipment is, therefore, wholly automatic in action, a feature which influenced construction

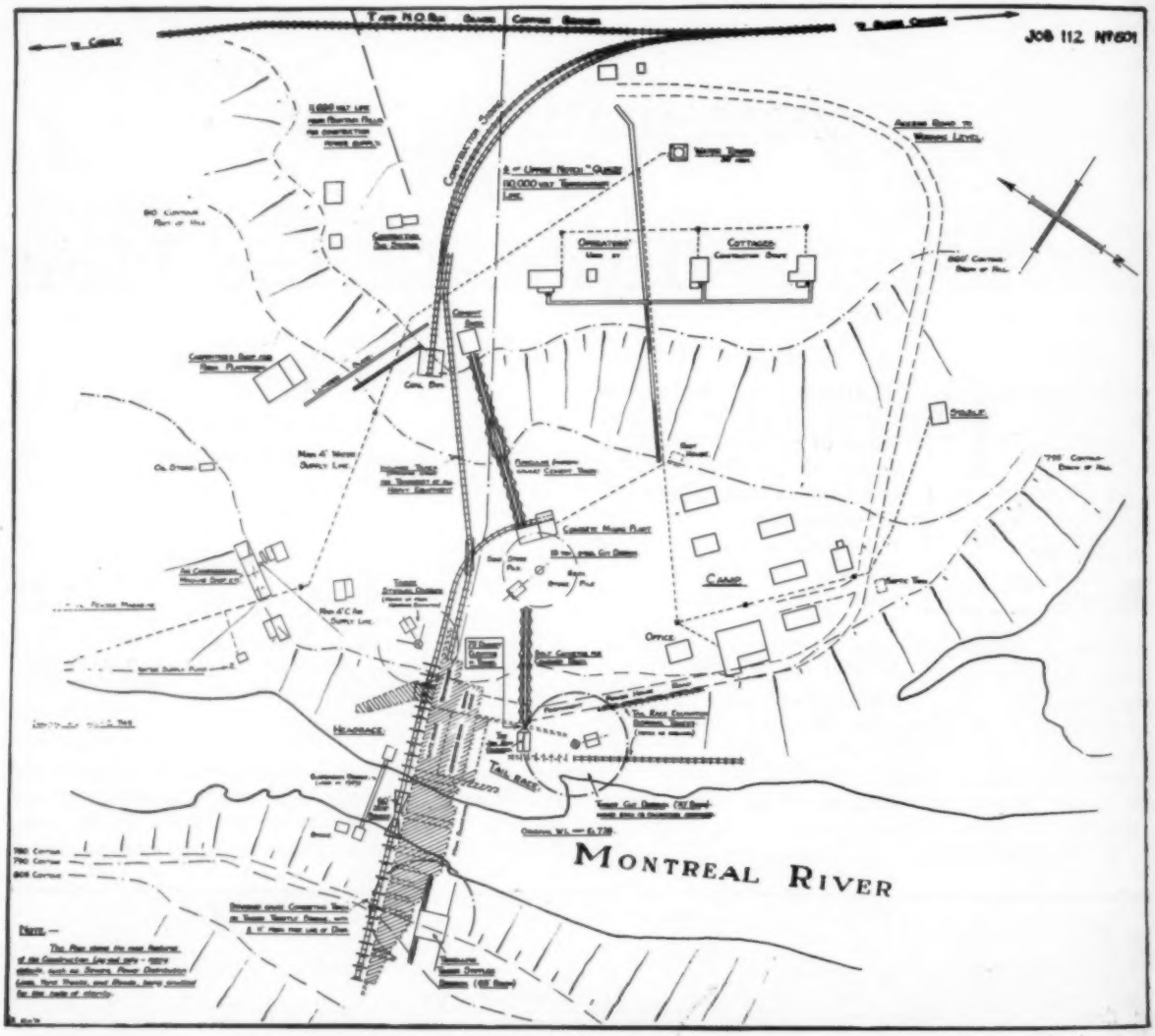


The Completed Upper Notch Plant on November 15, 1930

in necessitating a longer period than usual for the installation of the machinery.

PLACING CONCRETE AT FORTY BELOW ZERO

The construction of the plant was unusual in that 75 per cent of the concrete deposited was placed during winter months, throughout four of which the temperature can be said never to have gone above freezing point, and temperatures as low as 40 below zero were experienced.



Layout of Job and Plant at Upper Notch

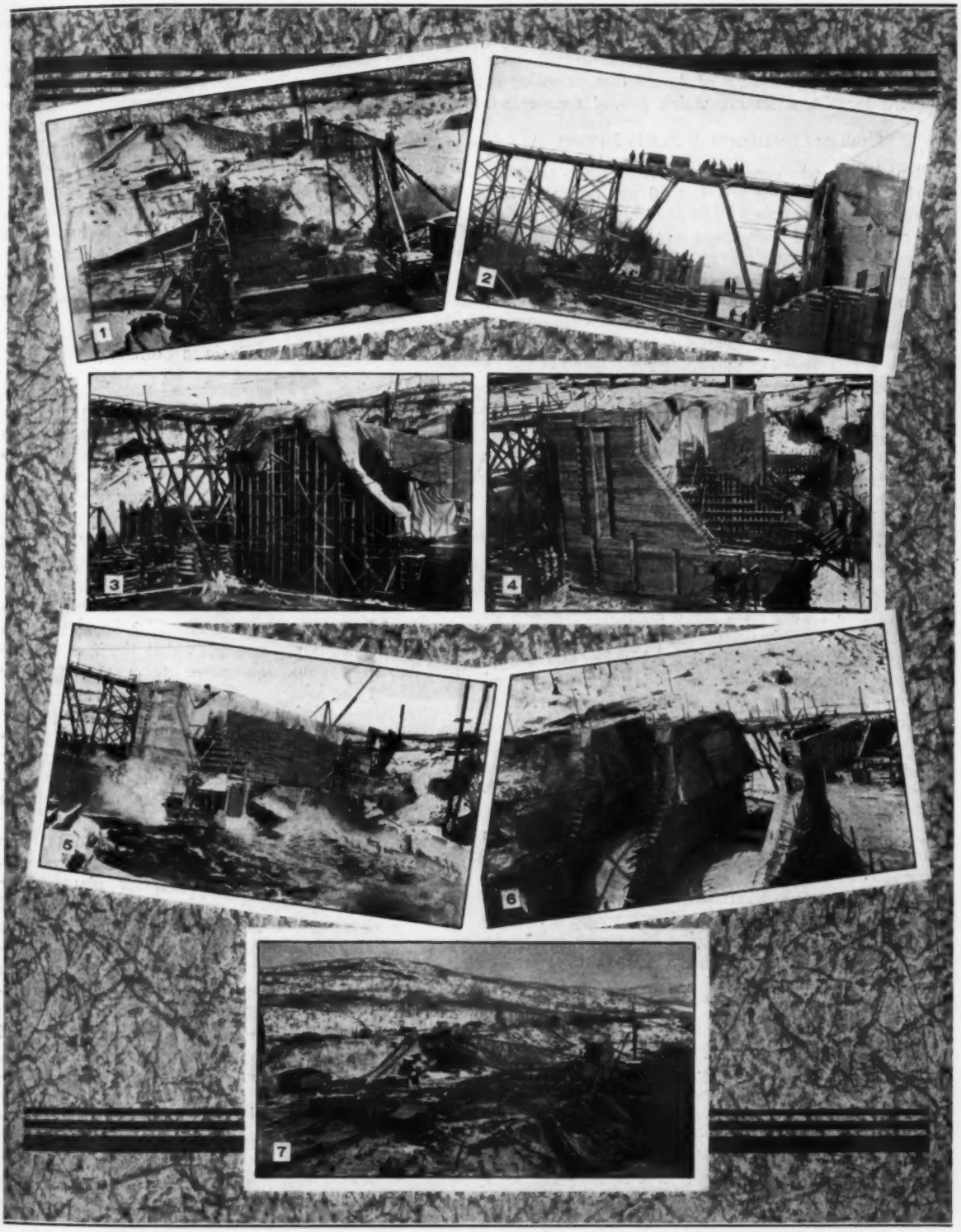
LOCATION AND START OF WORK

The site of the plant is about 20 miles from the mining camp of Cobalt, and was served by a branch line of the Temiskaming and Northern Ontario Railway, the nearest road being 5 miles from the job. At the start of construction in July, 1929, the entire area around the rapids which was dammed, was covered with bush. Clearing of this, therefore, constituted the first work undertaken, the building of camps and erection of the plant proceeding simultaneously. Excavation started five weeks after the inception of work and thereafter proceeded steadily.

Earth excavation amounted to 30,000 cubic yards, the greater part of which was removed by sluicing, and all of which was completed before the winter freeze-up occurred. Rock excavation, totalling about 12,000 cubic yards, was started as soon as possible. It followed usual methods, and all rock excavated for the power house substructure and the tailrace was crushed for use as concrete aggregate.

SPRING FLOOD SUCCESSFULLY AVOIDED

The river flow is characterized by a low flow during the winter followed by a heavy flood in the spring as soon as the break-up occurs. The general work schedule was arranged so as to take full advantage of this feature, and the principal river diversion was made during the latter months of winter, the entire river flow being diverted through an opening, left between two piers, 10 feet in width. This was achieved by building a cofferdam, of timber cribs, rock filled, faced with 3-inch sheeting and 30 feet high by 30 feet wide, across the old river bed, after all precautions had been taken to guard against the early rise in the upstream water level caused by this operation. All concrete work de-



PROGRESS OF WINTER CONSTRUCTION OF A HYDRO PLANT IN NORTHERN ONTARIO

1. *A view along the line of the dam, November 29, 1929.* 2. *View from downstream showing the trestle bridge, concrete train, main upstream cofferdam under construction and the housing around sluice pier No. 1, January 20, 1930.* 3. *Housing at sluice No. 1, and back of the housing for the gatehouse at the right, January 2, 1930.* 4. *Sluice pier No. 1, completed. The inside of the main cofferdam in the foreground, February 2, 1930.* 5. *Distant view of the gatehouse housing, sheeting of downstream cofferdam and discharge from the 10-foot opening, February 4, 1930.* 6. *The main sluiceways and sluice piers complete, showing the housing for the last lift, March 21, 1930.* 7. *General view of the Upper Notch project from upstream on February 22, 1930.*

pendent on the main cofferdams was completed ahead of schedule and five weeks before the spring flood started. The tailrace excavation was protected by a smaller cofferdam built up of flatted logs, supplied in standard lengths, a feature which proved economical.

CARE IN CONSTRUCTION PLANT LAYOUT

Plant layout was generally somewhat elaborate, considering the size of the job, but all was laid out with a view to keeping manual labor at a minimum, and this was certainly achieved, the average number of men employed being less than 150. Power was obtained, during construction, from the Fountain Falls plant, some miles upstream from the Upper Notch, at 11,000 volts and 60 cycles, and in consequence electric motors were used wherever practicable, compressed air operating one of four derricks and some small hand tools, as well as the rock drills.

The job involved the placing of about 20,000 cubic yards of concrete, and as the greater part of this formed that part of the dam built in the old river bed, and the power house substructure, the central mixing plant had to be designed and equipped for winter work, and all work in connection with concreting called for special methods.

FOUNDATIONS

When rock excavation was completed down to grade, all foundations were thoroughly cleaned by means of hot water and the judicious use of steam jets. The final cleaning was done with hand brushes and heated wet cloths, after which the cleaned rock was covered with tarpaulins under which small steam jets were set and left open until concreting was started. Immediately prior to concreting, the whole rock surface was washed with the hot water resulting from the condensation of the steam, and kept wet until covered with concrete.

Similar precautions were taken at all construction joints, concrete surfaces being checked by means of V-shaped boxes, and rock plums and steel dowels being used when occasion demanded them. Horizontal construction joints were picked and well roughened while still green, and well washed with hot water before the next lift of concrete was placed on them.

FORMWORK

Due consideration was given to the two methods available for winter work, i.e. the use of specially heavy form lumber, or alternatively, the protection of forms built of the more usual sizes of lumber. The latter course was adopted, all forms being built up of 1-inch boarding, braced by 2 x 6-inch studs and 4 x 6-inch walers.

All forms built during the winter months were surrounded by light timber housings, shaped to suit peculiar local conditions, the sides being covered with tar paper, and the roof with canvasses and tarpaulins to take the snow load. These housings were built one or two lifts ahead of the formwork, work on them being advanced when the weather was suitable. The interior of such housings was kept warm by means of coke-fired salamanders, placed at regular intervals, and situated on platforms adjacent to the walkways at the level of the top of the existing concrete. Frequently salamanders were placed inside the forms. The fire hazard was somewhat great, but by careful watching, only one small fire occurred throughout the winter. The largest of these housings was that surrounding the gatehouse substructure, which measured approximately 40 x 80 x 60 feet high. Temperature records taken inside this housing, but outside the forms, showed that the temperature did not vary by more than one degree from 30 degrees Fahrenheit, although temperatures outside varied down to 30 degrees Fahrenheit below zero. The beneficial effect of these housings on formwork can well be imagined, although it was almost impossible to estimate accurately the actual monetary saving of work done in this way as compared with work done in the open.

MIXING AND PLACING CONCRETE

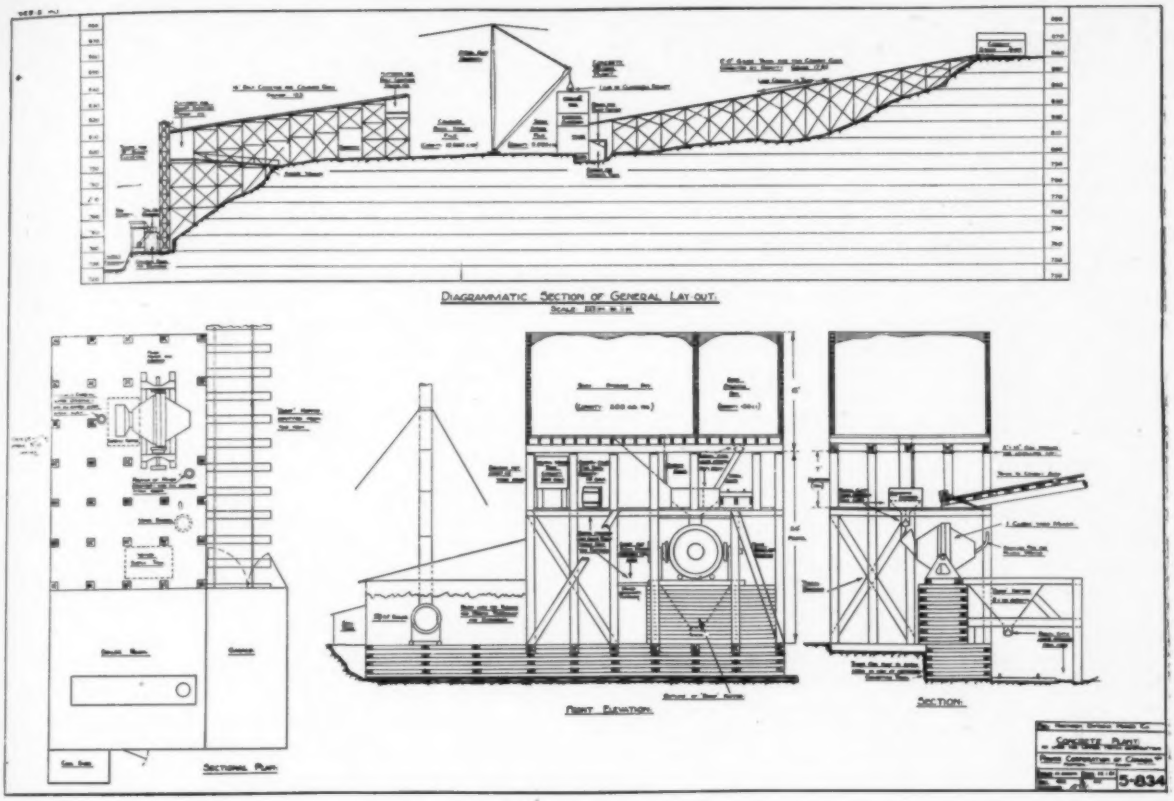
The heating of all formwork and foundations, as described, constituted one of the two main practices adopted in the placing of concrete at the Upper Notch during the winter. The second practice was to use warm materials in mixing the concrete so heated that the concrete when placed was still warm, after which the heat generated internally during the setting of the cement was sufficient to keep all frost away, provided that the forms were protected for some days, after the placing of the concrete within them.

By these means, none of the concrete placed throughout the job froze, or was damaged by frost; to which statement should perhaps be added the fact that no anti-freezing compounds were used at any time throughout the job.

The concrete mixing plant was designed especially for winter work, and also with a view to keeping manual labor at a minimum. The plant is shown generally in the accompanying drawings. The mixer had a capacity of one cubic yard, and the total number of men necessary for concreting rarely exceeded twenty-four under normal conditions. The record day's output was obtained with a crew of twenty men, the concrete being placed 550 feet from the mixer plant. Four hundred and forty-nine cubic yards were placed in 15 working hours, all batches being mixed for at least one and one-quarter minutes. The unusual feature of the mixing plant was the use of a hopper, with a capacity of 3 cubic yards, into which the mixer discharged directly, the hopper discharging into side dump cars running on a standard gage track and propelled to and from the plant, by a converted automobile truck. The side dump cars deposited the concrete in low hoppers, located at the desired position on the concrete track trestle bridge, light metal "elephant trunks" being attached to the bottom of the hoppers, through which the concrete was deposited in the forms. Sheet metal chutes, supported on timber racks, were used for some special lifts of concrete. The track on which the concrete train ran was located with its center line 11 feet upstream from the face line of the dam.

HEATING THE AGGREGATES AND MIXING WATER

The heating of the constituents of the concrete was a matter to which careful attention was given, and was the subject of a good deal of experimental work. The method finally adopted was to heat the mixing water and sand to such temperatures as would result in a



Section and Elevation of the Concrete Plant

temperature of the concrete, when mixed, of about 90 degrees Fahrenheit. The cement was naturally comparatively warm, in view of being stored inside buildings. To have heated it, would have been troublesome. Several trials were made to heat the crushed rock, one method being the insertion of a grillage of 2-inch steam pipes in the bottom of the rock bin. No really satisfactory results were obtained, however, due to the poor conductive power of the rock, and also to the insulating effect of the air spaces between the pieces of rock. Attention was, therefore, concentrated on the mixing of water and sand.

The mixing water was heated by allowing the exhaust from the steam heating pipe grillages in the storage bins to discharge into the main supply tank, these grillages being retained in use, although not particularly effective for heating the rock and sand, in view of the beneficial effect they had on the temperature of the mixing plant building. The sand was heated by a steam pipe grillage at the bottom of the storage bin, as in the case of the rock, and also by means of free steam jets which were found to be very effective. One jet was inserted in the bottom of the storage bin, and others, as many as could be arranged for, having regard to the capacity of the boiler, in the main sand storage pile. The jet in the storage bin was so placed as to heat the sand adjacent to the radial gate. It increased the moisture content of the sand, but once the jet was in constant use, the moisture content remained fairly uniform, so that due allowance for it could be made in determining the mixing water required. The steam jets in the main storage pile were peculiarly effective, in view of the great mass of sand to be heated. The interior of the pile was found to be still hot several weeks after steam heating was discontinued. The concrete cars were heated with hot water before taking out the first batches of any day. Thereafter, the concrete was hot enough to keep the cars reasonably warm.

All concrete was mixed for at least one and one-quarter minutes, but generally for longer than this, and as the mixer discharged into the dump hopper as soon as each batch was mixed, when operating normally, the rate of depositing concrete was reasonably quick. The overall average rate for the job, including all small and intricate lifts of concrete, was 25 cubic yards per hour.

The cement-water ratio was kept as low as possible, the average volume of water used being little more than 5 Imperial gallons per bag of cement, this low figure being made possible by the means adopted for depositing the concrete in the forms. Two men were always required to scrape out each dump car, even when tipped through 90 degrees. Slump tests were made frequently and as an indication of the quality of concrete used, several tests gave no appreciable slump at all. The concrete when deposited was tamped into place by men using tamping rods. Practically all concrete placed gave more than 2,500 pounds per square inch as the crushing strength, 5.2 bags of cement being used, as an average, per cubic yard of concrete.

SEVERE TEST OF CONCRETE

Some of the concrete placed in the way described

(*Continued on page* 104)

How the Other Fellow Did It

Construction Briefs

Truck Elevator for Foundation Excavation

83. Where excavation for a building project must be handled in such a way that truck traffic is eliminated from the surrounding streets, the method used by a Montreal contractor should prove advantageous. In this case absolutely no movement was permitted in the surrounding streets. First, the earth excavation was taken out by two steam shovels, leaving a bank of about 1 to 1 slope all around the hole. A vertical row of sheeting was then set about 8 feet up from the toe of the slope to take care of soft clay, and this was securely braced to the solid rock.

Next, the steel frame was erected and the concrete column fireproofing and floor arches poured. When this concrete work was properly set, wood sheet piling was driven outside the building line and securely braced to the framework of the building, thus holding the bank face while the clay and rock berms were removed and the foundation walls brought up to grade.

Since it was not possible to take trucks in and out of the hole by means of ramps after the first stripping operations were completed, as the ramp would have interfered with the method of conducting operations as outlined above, a truck elevator was installed, capable of handling a fully loaded 5-ton truck. This equipment operated very successfully and permitted operations around the entire basement simultaneously. 19.10.65

Dynamiting

84. A contractor near Corning, N. Y., has straightened a 6,000-foot channel, reducing the length to 5,300 feet, widening it from 4 feet to 25 to 30 feet and deepening it from 12 and 18 inches to 12 feet at a cost of about $6,000. The estimate for dredging was $25,000 and the time three months, while the actual preparation of the explosives took only one month.

Blasting was done by the propagated method, using 60 per cent dynamite. The blasting crew used boats to lay out the course and place charges. With the temperature as low as 8 degrees below zero, it was difficult, but the work was finally done in 27 working days, contrasted with the three months estimated for dredging. Eight and one-half tons of dynamite were consumed on the project. The job, which aimed to reverse the flow of a stream to provide additional water for a hydro-electric plant, actually paid for itself in kilowatt output in 16 days. EE-9-3-100

Single Steel Mast Used for Two Material Elevators

85. To conserve both space and equipment a Buffalo contractor used a 120-foot steel mast for the operation of two material elevators running on opposite sides of the mast. Each of these elevators was capable of handling three wheelbarrow loads of material. This same mast also carried a 20-foot portable derrick boom for hoisting steel, lumber and other long materials. The mast hoist was first operated as a concrete hoisting plant with an auxiliary material elevator running on the opposite side of the mast from the concrete bucket. When concreting was completed the bucket was removed and the second material elevator put on the mast, converting it into a double steel mast hoisting plant. 19.10.79

Unusual Mounting of Mixer for Pouring a Viaduct

86. In order that the 10-S and 21-S mixers used in pouring a 4,500-foot concrete viaduct would be readily portable, a contractor equipped both the 10-S and 21-S mixers with wooden towers, hopper and chutes, and then the mixers and towers were mounted on four old industrial cars so that they could be moved along the viaduct as needed. With this mounting they were moved over 1 mile without any trouble. The 10-S outfit was equipped with a gasoline engine with a power take-off to handle both the mixer and the concrete bucket. The towers were guyed back to the columns and girders of the viaduct as well as to trees along the right of way to steady them. The concrete was chuted direct to the forms for the superstructure as far as possible, but on a section over railroad tracks where the floor system was 65 feet above the ground level with a 4 per cent grade either way, the concrete was buggied for the entire work, the plant remaining stationary and the loaded buggies working down grade. 19.10.74

Contractor Used Elevated Siding for Batching Operations

87. On a Pennsylvania highway project last summer the contractor used a novel plant layout to handle cement, stone and sand from a railroad siding 26 feet above street level. At the first stop the truck received the required number of bags of cement which were chuted from the freight car to a cement loading platform at truck level. Moving a short distance forward the truck received the proportioned amounts of sand and stone from a batch bin which was loaded from the higher level through two wooden chutes served by a crawler crane located on the far side of the track. Stone and sand were picked up from the car and delivered either direct to the batcher or stockpiled to one side adjacent to the track.

An ingenious method of obtaining water was also employed. The season was dry and water disappeared completely from the local streams. Instead of laying a 4-mile pipe line to the nearest large river, the contractor drilled two wells, one 95 and the other 65 feet deep. Steam was injected into the wells which jetted out the water. The water was run under the roadway through an existing drainage pipe to a reservoir from which it was pumped to the mixer. A.A. 65-4

Novel Batch Boxes for Delivery to Depressed Skip

88. A novel type of construction was used for batch boxes on a concrete viaduct job in Arkansas. The boxes were hauled in trains of 10 to 12 cars by 3½-ton locomotives, the boxes having four compartments per car. Each of the compartments had a bottom built on a 40-degree slope, so that the batch would slide out quickly when the side doors were opened, discharging directly to the depressed skip of the building mixer at the base of a wooden tower. The compartments were 4 feet high, 4 feet wide across the cars, and each box 1 foot wide along the car. The size of the compartment was so designed that no matter whether a 1:2:4 or a 1:2:3 mix was used, one compartment would hold a batch for a 10-S mixer and two compartments would hold sufficient for a batch for a 21-S mixer. 19.10.73

The Vianova Contracting Company, Vienna, Austria, Is Using This Outfit to Haul Materials for Grading the New Glocknerstrasse, a Government-Sponsored 80-Mile Highway Through a Pass in the Alps Between Austria and Switzerland. This Highway Is Being Built to Encourage Austrian Motor Tourist Trade. Photograph Courtesy of Cleveland Tractor Company.

Controlling Profits—

A Study of the Part Played by Hauling Costs in Construction

ON a contractor's ability to meet his schedules on time depend his profits. In most types of work, the biggest single item in his costs is the cost of time, as represented in his outlay for labor. Of all his costs, his expense for labor, or time, is the one that is most subject to fluctuation and most difficult to control. Material costs can be estimated with fair accuracy in advance and can be controlled by skillful purchasing but when it comes to labor costs, the contractor is at the mercy of ever-changing conditions. Every delay cuts down his profits. A 15-minute wait at the mixer, the breaking of a hoist, a one-hour repair on a shovel, all such delays play hob with his day's program and reduce his profits by increasing his labor costs.

To be sure, any individual delay may not seem important, but every delay that keeps men or machinery idle, even for a short time, contributes to a total loss that may mount high in the end. Even slight delays in the initial stages of a job may exact penalties all along the line. As the number of men on a job increases and the payroll costs grow larger, time losses may eat up the entire profit on a job.

During a very interesting investigation by the General Motors Truck Co., contractors again and again pointed to the element of time or labor as the basis of their profit on the job. When asked how to prevent excessive labor costs, their answer was usually, "Schedule the movement of materials both to and from the job so that labor is never delayed. Then you have gone far toward eliminating loss."

Saving Money by Better Truck Operation

Whether a contractor uses his own trucks, depends upon the hauling equipment of sub-contractors or relies on the trucks of a local supply yard, efficient truck operation that moves materials exactly as needed is a first consideration. That ideal can only be attained through better direction of truck operation.

It is true that correct operation of the trucks may depend largely upon other factors, such as provision of the right fleet capacity, on the selection of suitable trucks and auxiliary equipment. As a general rule, however, these other factors cannot be considered to fullest advantage until sound and reliable operating methods have been developed. The starting point for any consideration of increasing profits by the better use of trucks, should be definite planning for better truck operation.

Three Fundamental Rules of Truck Operation

Trucks like any other machinery are simply tools which the contractor uses in his work. To get the most from these tools, they must be handled properly. It is, therefore, important for every contractor to know the basic rules for using trucks profitably. By following these rules, he gains both effective and timely movement of materials and also lowers the cost of truck operation.

Profitable truck operation is based on three important rules:

1. Keep each truck in active use the maximum part of each working hour throughout the day.
2. Give each truck its specified load on each haul.
3. Make sure that each truck travels at the maximum established speed that is safe for the load and the haul.

These rules are ideals which cannot always be fully attained in actual practice on concrete jobs, but, unless there is consistent effort to apply these three fundamental principles, excessive losses are certain to occur.

Take an example which is typical. Faulty truck operation produced the following time losses for a mixer on one construction job. The figures given are minutes on each of ten successive days: 34, 29, 61, 36, 87, 78,

A Six-Wheeler Hauling Sand

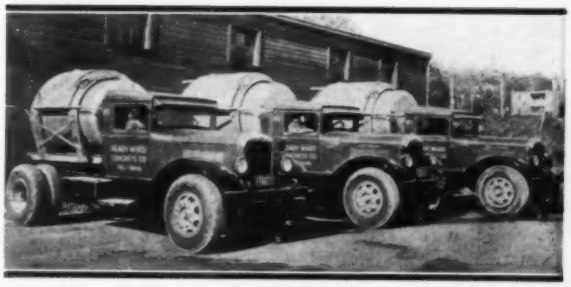
Through Proper Truck Operation

112, 117, 138, and 124, making a total of 816 minutes lost in 10 days. Valuing labor and mixer time conservatively at 70 cents a minute on this job, the cost of lost time in 10 days was $571.20, to say nothing of other losses less easily traced. Since timely movement of materials is the first requirement of truck operation on a contract job, the first rule for sound truck operation—keep each truck working a maximum part of every hour in the day—is doubly important. Delays and lost time may mean that materials will be slow in reaching the job. Those same delays by lowering the productiveness of the trucks will increase the cost of moving materials. Only when the contractor has eliminated every possible cause of delay can he be sure that his movement of materials will be both timely and economical. Delays in truck operation occur in loading, driving, unloading and maintenance.

Time Saving at the Loading Point

Time saving and profit making begin right where the truck is loaded. When a contractor relies on supply houses or subcontractors to bring materials to the job, the methods they use in loading their trucks may, of course, be something beyond his control, although it is often likely that their delays in loading may hold up his own men on the job itself or lead to waits that will interfere with his schedules. But when he operates his own trucks, efficiency in loading should receive his careful attention. For example, one busy general contractor who operated 18 trucks on full time from his own supply yard, had installed a make-shift hopper built by his own workmen. On the average it took one minute longer to load and trim than would have been required with a properly designed commercial hopper. When the hopper was almost empty the last yard of material had to be shoveled through the vent. On the average each truck made eleven trips a day, so here was a loss of eleven minutes per truck or a total of 198 minutes for the fleet each day. In other days more than 3 hours a day were wasted. Figuring truck time as worth $2.50 per hour, the waste was $7.50 a day, or $187 a month. At that rate two hoppers of proper design would pay for themselves in a relatively short time.

Similarly, opportunities to save time and money present themselves again and again. On one excavating job, an average of 1 minute and 38 seconds was lost in bringing each dump truck into loading position. With 12 trucks on the job, each making 8 trips a day, the total time wasted in a day amounted to 2 hours and 36 minutes unproductive time for the trucks and idle time for the shovels. In this case to be sure, it would have been impossible to eliminate all of the loss of time. The difficulties in routing the trucks at the loading point made some wasted time inevitable, but when a few simple changes were made, permitting the trucks to pass



A Group of General Motors Trucks Carrying 3-Yard and 4-Yard Capacity Paris Transit Mixers

a shovel with less maneuvering, the waste time was cut to less than 30 seconds a load.

Batching Plant Layout Can Save Time

While a contractor operating his own batching plant or supply yard may not be able to make costly changes in his layout in order to effect small improvements in loading, simplicity in arrangement always deserves careful study. Often some easily made change such as widening the entrance to permit free passage of trucks will materially speed up the loading.

Three Ways to Speed Up Loading

While a "straight driving" layout which enables the trucks to move through the yard without needless stopping or backing is one of the prime requirements in saving time in loading, three other important features are also found in the yards of contractors who have been most successful in avoiding loss of time in loading their trucks.

First, an easily accessible yard or job office with a slide panel window for handing out orders is helpful. It discourages drivers from coming in for a chat. Furthermore, if the superintendent or clerk has a commanding view of the loading area, the drivers are more likely to load faster.

Second, a loading platform opening directly out of a central supply shed is helpful, so that bags and boxes of supplies can be swung directly onto the truck.

Third, a definite system of order keeping with order forms large enough to assure all data necessary to facilitate prompt loading and perfect records, is very helpful.

Saving Time on the Road

After the truck has left its loading point, saving time in getting to the job or in making the round trip between the job and the loading or unloading point depends on the driver's knowledge of the route, the condition of the route and his skill in driving. It may also depend, however, upon the choice of the route itself. This is especially true of any job that involves placing a fleet of trucks on an established route for a considerable length of time, as in removing excavated material or in bringing supplies to a road building crew. It is also

particularly true where trucks have to use a new graded road or a detour and it behooves the contractor in this case to keep a small maintenance crew on the job at all times.

The most common error when two or more routes to and from a job are available is to assume that the shortest route is necessarily the best. In more than one instance, a slightly longer route offering better road conditions, fewer stops or fewer and lower grades may prove the speedier. Thus, the selection of an established route for fleet operation may require more than mere study of comparative mileage. The one sure test, of course, is to make that run with loaded trucks over the alternative routes. A saving of 5 minutes on a trip on each truck will mount into a considerable gain on any job of fairly large size and many reduce costs in several ways, such as by providing quicker delivery with fewer waits on the job, by increasing the daily tonnage of each truck and by enabling the operator to haul the same or larger tonnage with a smaller fleet.

FIVE RULES FOR THE DRIVER

It is seldom wise to leave the actual routing to the judgment of the driver. Far too often the average driver thinks that as long as he keeps moving at a fair speed, he is doing his part. A few blocks one way or the other may not seem important, but every truck superintendent knows that waste mileage, unless counterbalanced by a gain in speed, will be reflected in extra consumption of gas and oil, extra wear on tires and trucks and an appalling loss of time that should be spent productively.

For that reason drivers should be given five fundamental rules:

1. Follow the route prescribed by the superintendent.
2. Maintain consistently the maximum safe speed allowed for the truck.
3. Report promptly any delays or breakdowns.
4. On poor roads don't take chances on mud holes, rough spots and railroad tracks.
5. Don't take chances on accidents. The safe way is the quickest way.

Special attention should be given to reporting breakdowns and delays immediately. If a driver sees that a delay is likely to be longer than a few minutes, he should phone in promptly or send word in by the next truck, so that the office can provide another truck. A driver can make or break a time schedule. Careful instructions are the best insurance against losses on the road.

PREVENTING DELAYS AT THE UNLOADING POINT

In contracting, the most serious delays in truck operation are usually those which occur at the point of actual delivery. Often therefore, time saved at this point will show up as the greatest gain in profits, both by reducing time lost on the job itself and also by putting the truck operation on a sounder basis. How to save time in unloading is thus a vital question for the contractor who operates his own trucks, and even the general contractor who owns few trucks will usually find it profitable in the long run to cooperate with subcontractors.

In unloading sand and gravel for a building operation, the pit at the mixer should be of sufficient capacity to take the entire truck load. A 5-yard load for a 3-yard pit means fully 5 minutes extra dumping time. On a road job there should be sufficient space for dump trucks to back up to the mixer with a single turn of the wheel. Narrow turning space requires jockeying around and a considerable loss of time. In handling cement where it is delivered in bags, sufficient labor should be available immediately when unloading. It takes one man 55 minutes to unload a 200-bag delivery. Three men can do it in 20 minutes, saving 35 minutes of truck time. When trucks are used in hauling batch loads to mixers, a considerable amount of time is lost in adding cement to the batch in untying bags and in dumping. The volumetric measure with gravity dump aids considerably in saving time in this type of work.

THE COST OF REPAIR TIME

Time spent in the repair shop is waste time. Its cost may easily become a serious cause of loss, especially in the case of the contractor operating a fairly large fleet of his own trucks. When truck equipment is laid up in the shop, the loss to the operator is immediate and direct. To begin with he faces the cost of the repairs themselves, but that is only one portion of his loss. On top of that he has the loss from idle time on the truck, the cost of providing extra equipment to take the place of trucks being repaired and the cost of delays on the road and delays on the job.

To prevent or reduce these losses requires well planned, consistent effort in scheduled maintenance, strictly enforced and in the thorough training of drivers.

FOUR STEPS IN MAINTENANCE

The first requirement in keeping trucks out of the repair shop for any length of time is to take them into the shop frequently enough for preventive maintenance. Many major repairs are the direct result of failure to correct minor troubles promptly. For that reason, any contractor who operates a fleet of trucks on fairly steady work should set up a definite maintenance program which can be enforced regularly. The four main steps in this maintenance program should be:

1. Daily reports by drivers on the conditions of the trucks.
2. Oil change, greasing, battery inspection and tire inflation on regular schedules.
3. Complete thorough inspection at regular mileage intervals.
4. Yearly overhauling during the slack season.

The daily report of the driver is a fundamental factor. The driver who runs the same truck day after day should know better than anyone else what troubles are developing. His constant cooperation will assist in the preventive work that cuts down major repairs. And his cooperation can be obtained by (1) giving him a definite routine to follow and (2) giving him to understand that prompt reports of trouble count in his favor and are not regarded as black marks against his driving record.

TRAINING DRIVERS TO REDUCE COSTS

In any effort to reduce maintenance costs on truck operation the key man is naturally the driver himself. This has been abundantly proved by the experience of large contractors who occasionally find it necessary to

switch drivers from one truck to another. In virtually all such cases, differences in individual responsibility of drivers registers almost instantly.

The extent to which drivers can be trained to take pride in their trucks and assist in reducing repair costs is, of course, dependent on the steadiness of their employment and on the supervision that can be given them. In some instances, contracting firms handling a fairly steady volume of such work as excavating and road building, have found it practicable to give drivers rather thorough training. An eastern contracting firm, for instance, puts its drivers through a regular training. Meetings are held at regular intervals to discuss various pertinent subjects. When occasion offers the meetings are also used for talks by service experts of truck manufacturers or by representatives of manufacturers of special auxiliary equipment.

ORGANIZED EFFORT REDUCES LOSS

While not every contractor, of course, can profitably undertake a training program, it is well to remember that everything that can be done to reduce excessive repair costs will contribute directly to more profitable operation. Many contractors, unfortunately for themselves, are content to hire drivers, put them to work with little or no instructions and then periodically jerk them up when their work shows shortcomings. Ordinarily, this procedure accomplishes little or nothing. The damage is done before any effort is made to prevent it.

DRIVERS MUST HAVE AN INCENTIVE

Training alone will not, of course, eliminate unnecessary maintenance expense. To produce results worth getting, the training must be backed up by a definite incentive for better performance.

The best incentive usually is some form of bonus plan which gives the driver a natural interest in the economic operation of his truck. Many such plans are in use. One successful plan offers a flat bonus of $15 a month for good performance with deductions according to some such schedule as follows: $2.50 for accidents caused by the driver; $2.00 for violations of the safety rules; $1.00 for repairs due to poor driving; $1.00 for failure to report needed repairs; and $1.00 for proved loafing on the job.

TURNING TIME-SAVING INTO PROFITS

In truck operation time-saving is not an end in itself. The value of saved time depends upon the results from the savings, not upon the saving itself. But time saved by better loading and unloading, by better routing and driving and by avoidance of breakdowns and repairs shows up quickly in definite profits to contractors. Even though a few minutes here and there may seem relatively unimportant, the total saving resulting from careful truck management often leads to measurable gains.

The benefits of time saving show up first in the form of lower payroll costs on the job itself. Delays caused by inadequate material supplies are eliminated or made less severe, thus schedules become easier to meet, penalties are avoided and layoffs and idleness are reduced. There is less need for overtime for labor and for trucks. With steady reliable transportation of materials, overtime for workmen on the job and for truck drivers becomes less likely to be necessary. These big savings alone may be enough to warrant constant attention to the problem of saving time in truck operation.

A General Motors Truck with Dump Body in Service in Fulton County, Georgia

REDUCING THE NUMBER OF TRUCKS

Beyond the automatic savings on the cost of labor, however, lie other possibilities of increasing profits by reducing the investment in truck equipment or the cost of hiring trucks. On large operations a very small saving in time on each truck may make it practicable to handle the movement of materials with fewer trucks. In a fleet of twelve trucks, for example, a saving of five minutes an hour on each truck, will enable the operator to handle the same tonnage or yardage with eleven trucks instead of twelve. In a fleet containing twenty trucks, a saving of three minutes an hour on each truck will accomplish the same results. The larger the fleet the smaller the time saving needed in order to eliminate one truck. When a hauling operation can be handled on the same time schedule but with fewer trucks, the lower the cost per ton or per yard becomes.

ACKNOWLEDGMENT.—This article has been prepared from a much more extensive discussion of the important subject "Operating Trucks Profitably in Contracting," which is based on a report of a nation-wide survey of truck operation in contracting, published by the General Motors Truck Co., Pontiac, Mich. Copies of the complete report may be secured by writing direct to General Motors Truck Co.

Modern Diesel Engine Practice

WRITTEN by a recognized authority and student of modern diesel engineering and operating practice, Orville Adams, this book combines a text for study and reference and practical manual on operation and repair in one volume. The information is presented in non-technical language and includes twenty-one chapters of technical data for diesel application, modern installation practice, including the standards of the Diesel Engine Manufacturers' Association and the Underwriters' Regulations for Standard Installation, and numerous tables, charts and operating data.

High speed oil engines of recent design for all mobile applications, such as shovels, dredges, draglines, industrial and railroad locomotives and tractors are shown. Several chapters with layout drawings consider the stationary diesel engine. All auxiliaries, air filters, pyrometers, exhaust silencers, and centrifuges are described and illustrated. The instructions on lubrication, maintenance, operation and repair of engines are very complete.

Modern Diesel Engine Practice is a complete text book and is equally valuable to the student, mechanic or operating engineer. It is published by the Norman W. Henley Publishing Co., 2 West 45th St., New York. Price $6.00.

Excavation Methods to Suit

11.5-Mile Grading Job Had One-Half of 240,000 Yards of Excavation At One End So Shovel Took Big Bites and Wheelers, Light Cuts

IN old song runs, "and make the punishment to fit the crime." Such is the need of the contractor in selecting the equipment to tackle various kinds of grading even on a single job. In the case of the Twiggs Construction Co., and W. R. Eve, Augusta, Ga., contractors for the grading of 11.5 miles of road mostly over new location between Cheraw and Patrick, S. C., both a power shovel and wheelers were used.

Work was started on April 15, 1930, with an allowance of 240 working days. A Northwest 1¼-yard shovel was started at the Cheraw end of the work where about 130,000 yards of the total of 240,000 yards of excavation was located. The excavation was hauled from the shovel to maximum distances up to 1,000 feet by a fleet of six trucks all equipped with metal bodies and Wood hydraulic hoists. There were four Indiana and two Hug trucks in the hauling fleet.

There were three borrow pits on the work, one of 40,000 yards. The excavation and borrow were bid at 27 cents per cubic yard.

The labor organization for the shovel excavation included one shovelman, one oiler, one pit man, three laborers on the dump, six truck drivers.

The Wheeler Outfits

Two wheeler outfits which duplicated each other as far as numbers and work were concerned were used on the Patrick end of the work. There were nine or ten wheelers active in each outfit with 2-up mule teams. The Western wheeled scrapers were loaded with the aid of a snatch team, and a plow team was held in readiness except when the Caterpillar Thirty could handle the plow to better advantage. While it was planned to handle the wheelers on a total haul of 1,000 feet when the work was started, it was found more economical to use the wheelers for hauls of not more than 400 to 500 feet and handle the remaining cuts with a power grader. This worked out very well indeed as there was no rock on the whole job and the dirt was a light sandy soil with a little clay which was easily handled by the grader.

Sizes of Cuts and Fills

The cuts ran from zero to 3 feet in depth on the lower end of the job where the wheelers were used and on the upper end, where the shovel was used, the cuts ran from nothing to 18 feet and the fills from zero to 23 feet.

There were some marshy spots on the job but not large or deep enough to prove troublesome. Thompson Creek which empties into the Peedee River about 3 miles below the maximum fill was watched with some interest after every heavy rain, as the backwater might have caused some trouble before the fill had a chance to compact. As there was no current at this point and the high water mark was only 7 feet up on the fill this possible source of grief did not cause more than passing anxiety.

Personnel

The contractor for this job was W. R. Eve, of Augusta, Ga., who personally supervised the work. Twiggs Construction Co., John A. Twiggs, President, was awarded a subcontract for the grading at Thompsons Creek. A. B. Smith was Superintendent, and P. B. Willingham was Resident Engineer for the State.

Legal Points for Contractors

These brief abstracts of court decisions in the contracting field may aid you in avoiding legal difficulties. Local ordinances or state laws may alter the conditions in your community. If in doubt consult your own attorney

Edited by A. L. H. Street, Attorney-at-Law

Dishonoring Post-Dated Check Is Not a Crime

Where an owner has long dillydallied with a contractor in making a final payment, and has at last given him a postdated check, and the contractor now sits at his desk stunned by a message from his bank to the effect that the check was not made good, it ought not to be difficult to convince the contractor that the maker of the check ought to be sent to prison for life, if not hung.

Nearly every state, if not all, has a statute making it a crime to secure money or anything else of value on the faith of a "phony" check purporting to be payable on demand. But few, if any, of these statutes apply to postdated checks.

In the case of People v. Mazeloff, 242 N. Y. Supp. 623, the Appellate Division of the New York Supreme Court decided that the New York statute, making it a misdemeanor to give a check against insufficient funds, does not apply to postdated checks. The court said:

"Fraud cannot be predicated upon nonperformance of a future promise, and a postdated check is a mere promise to discharge a present obligation at a future date.

" 'The fact of its non-payment when the due date arrives—without more—is no more evidence that it was given with fraudulent intent than is the permitting of a promissory note to go to protest proof of such intent.' . . .

"We think . . . that the implication of giving a postdated check is that the maker has not presently funds on deposit rather than that he has."

The creditor who prosecutes a debtor for nonpayment of a postdated check is inviting a suit for damages on the ground of malicious prosecution.

The Law of "Attractive Nuisances"

The equipment of contractors may be, and often is, so used as to render a contractor liable in damages for maintaining what the law calls an "attractive nuisance." An "attractive nuisance" is a dangerous contrivance of such character as to naturally allure children not aware of the risks they are taking.

The subject is well illustrated by the case of Morse v. Douglas, 290 Pac. 465, decided by the California District Court of Appeals, July 11, 1930. There the defendants, contractors, were held liable for death of a seven-year-old youngster who was fatally burned through tipping over a two-wheeled tar vat in which workmen had left boiling tar when they quit work for the day at 4:30 P. M. The vat stood in a street near the curb.

The court decided that contractors who do work in residential neighborhoods are bound to foresee that there are youngsters living nearby and to use reasonable measures to avoid exposing them to dangers resulting from their being attracted to equipment, etc. The court said, in part:

"The contrivance must be artificial and uncommon, as well as dangerous, and capable of being rendered safe with ease without destroying its usefulness, and of such a nature as to virtually constitute a trap into which children would be led on account of their ignorance and inexperience. . . .

"The trailer with its fire box and vat of boiling and smoking tar, with a convenient stick protruding with which to stir the molten mass, was attractive to children. The contrivance was dangerous in the position in which it was left with its tongue elevated so that an added weight on the rear would overbalance it and throw the boiling tar over one standing or lying to its rear. This should have been apparent to an adult of usual experience taking the most ordinary interest in the safety of others. It was artificial and provided an uncommon danger. A pot of boiling tar so balanced on two wheels that it could be easily overturned presented a threat to the safety of children not usually met in their play."

An Interesting Question of Interest to Contractors

Wrongfully detaining money definitely due a contractor entitles him to additional pay for the time that the money is so detained—interest.

The Nebraska Supreme Court dealt with this subject in the case of Petersen v. City of Omaha, 231 N. W. 2d, 763, decided July 17, 1930. What the court said concerning a contract for construction of a municipal sewer seems to apply with equal force, not only to other public construction contracts, but also to private work.

The court decided that since a certain amount was definitely due the sewer contractor on a certain date but was wrongfully withheld, he became entitled to interest at the legal rate on the principal amount from that date.

But the same opinion recognizes that where a city temporarily withholds payments in good faith as indemnity for damages resulting from defective work for which the contractor is liable, interest does not run. The general rule of right to interest not specially contracted for is that it does not commence to run until the principal amount is definitely ascertained.

Unit Basis of Paying for Highway Construction Approved

Because of the impossibility of accurately foreseeing how much labor and material will be required in the construction of a given road improvement, the Oklahoma Supreme Court finds in the case of Leininger v. Ward-Beekman & Brooks, 282 Pac. 467, that state highway contracts are very appropriately awarded at unit prices. The court said on this point:

"It is doubtful if any other arrangement could be made for such a contract. Certainly no definite contract price could be agreed upon without a preliminary survey of sufficient accuracy to warrant both the state and the contractor accepting the same as a basis for the contract. It appears to us that there must be sufficient elasticity in the agreement to provide for the correction of errors or changes in the plans. To attempt to fix a definite contract price would no doubt increase the cost, either in engineering work or increased bids. 'Good business management,' as directed by the act, no doubt prompted the highway commission to adopt a system for contracting which has long been followed by railroads in construction work, which is recognized in the law."

Compromising Criminal Charges a Dangerous Practice

The contractor who finds that he has been made the victim of a crime entailing money loss upon him—for example, embezzlement by a cashier or other employee, theft of materials, issuance of a forged or "phony" check—will do well to bear in mind what action the Law permits him to take. When one of the above-mentioned crimes has been committed, the Law recognizes the existence of two courses of action, either or both of which may be taken against the culprit. The State may punish him and the aggrieved party may sue for return of what has been stolen or embezzled, or its value. The State is not concerned whether or not the loss is made good; its only interest is to deter others from committing similar offenses, by making an example of the thief or embezzler. And the aggrieved party has no legal interest in the prosecution not shared in common with every other citizen of the State.

There is a widespread, but erroneous, notion that the victim of a crime has the power to determine whether or not there shall be a prosecution, and that he may use this power as a means of making the offender "cough up." Unwittingly, the victim often becomes a felon himself, either by threatening a prosecution or by making a settlement under promise not to prosecute.

To threaten the thief with prosecution unless he pays back what he stole is blackmail. Therefore, the victim of a petit larceny, punishable by fine or imprisonment in the county jail for a year or less, may let himself into the state penitentiary for several years by merely threatening to prosecute the thief unless the stolen money or property is returned.

The victim may, of course, accept a voluntary return of what was stolen or its equivalent, but to accept it on an agreement not to prosecute or not to testify against the offender is a serious offense, also punishable by imprisonment in the penitentiary—compounding a crime.

In a case lately decided by the Louisiana Court of Appeals (130 So. 120), a father who gave a check for the value of goods stolen by his son successfully defeated liability on the check. The court applied the following well-settled rule of law:

"Where a note or other contract for the payment of money is given in settlement of a civil liability for a criminal act, and also for the purpose of suppressing a criminal prosecution for such act, the note or contract is not enforceable."

Riding to and from Work as Part of Workman's Employment

A construction company's laborer was accidently thrown from a truck while riding on it to a quarry where he was employed. Death resulted and question arose as to whether or not he was killed in the course of his employment, within the meaning of the New Jersey Workmen's Compensation Act.

The truck was owned by the employer and was used in hauling materials, but afforded the only means the employee had of going to and from his place of work, 13 miles from where he and other employees lived. There was no express agreement that he was to be provided with transportation, but the circumstances indicate an implied understanding that the employees could use the trucks in going to and from their work.

In an opinion filed June 21, 1930, in the case of Alberta Contracting Corp. v. Santomassimo, 150 Atl. 830, the Supreme Court decided that an award was proper. The court laid down and applied the following stated rule of law:

"The relation of employer and employee continues while the employee is riding to and from his employer's premises, in a truck used in connection with his employer's work, by direction of his employer, with his knowledge and acquiescence in the continued practice, which was beneficial to both the employer and employee; and an injury sustained while so riding arises out of and in the course of his employment."

Validity of Assignments of Contract Funds

Douglas Fairbanks invested some of his surplus funds in a California ranch, and employed a contractor to make extensive improvements. The contract contained a clause to the effect that "party of the second part (the contractor) may assign any or all moneys due under this contract upon written consent of the party of the first part (Fairbanks)."

In the case of Fairbanks v. Crump Irrigation & Supply Co., 291 Pac. 629. disposed of October 7, 1930, the California District Court of Appeals decided that the clause above quoted did not permit an assignment of moneys before they became due nor without Fairbanks' written consent. The court said:

"Appellant rightly says that no such language was needed to make payments due assignable. But the language, having been used, must be given some effect, and it would have none unless it were tantamount to a provision that payments should not be assigned until due, and not then without Fairbanks written consent. We are aware of no reason why the provision, as so construed, should not be given effect."

Question was also raised in this case as to the right of Fairbanks' ranch manager to bind him by an acceptance of the assignment. On this point the court decided that the manager had ostensible authority to accept the contractor's assignment, by reason of the fact that Fairbanks had authorized the manager to sign a construction contract, and had permitted him to handle all pay rolls for routine ranch work.

Powers of Corporations

A contracting corporation has all the legal rights in general that an individual or partnership engaged in the same line of business would have. But there are important exceptions to this rule. One of them was involved in the case of Rodgers v. Krankenhagen, 232 N. W. 327, decided by the Minnesota Supreme Court October 3, 1930.

The court pointed out that an ordinary commercial corporation has no charter power to become guarantor of another party's obligation, unless the charter so specifies.

In the same opinion, the court notes that acts of the secretary-treasurer of a corporation, unauthorized by the board of directors and by the corporation's charter, could not render the company liable on such a guaranty.

Contractor's Rights When Owner Delays Payments

"Father Knickerbocker," said a sewer contractor to the City of New York, "you caused me a heavy money loss through delaying payment of those monthly estimates. For want of funds to carry on the work, my plant was idle. I expect you to make that loss good."

"Sorry, old man," answered "Knick" as he took a pinch of snuff, "but my lawyer tells me that I am not legally liable for more than interest on the payments for the time that they were withheld beyond the due dates."

They could not convince each other and the matter was checked up to the Appellate Division of the New York Supreme Court, which decided (O'Rourke Engineering Construction Co. v. City of New York, 241 N. Y. Supp. 613—April 25, 1930) that Father K's lawyer had correctly advised him.

The court cites other court decisions where contractors were held to be entitled to damages for being delayed in prosecuting their work through delay of the owner in providing the site, etc. But in those cases the owner's delay was the direct and natural cause of the contractor's loss. Not so in this case. When Father Knickerbocker fell behind in his payments, the contractor could have chosen to terminate the contract and recovered what was due him or he could go ahead and sue for the delinquent installments. By electing to treat the contract as remaining in force he debarred himself to recover more than interest on the overdue payments.

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Noteworthy Athletic Plants and Stadia

Reported by the Office of Gavin Hadden

The Athletic Field, Stadium and Field House at the High School, Phillipsburg, New Jersey

AMONG the recently completed works which were designed and supervised by GAVIN HADDEN, Civil Engineer, 607 Fifth Ave., New York City, are several interesting new projects for the playing and viewing of athletic games, both indoor and outdoor. This office has for some years specialized in the design of projects of this kind: athletic fields, gymnasia, field houses, swimming pools, tennis court buildings, etc. Mr. Hadden's work has also extended into the related field of airports and landing fields. Work which he has completed during the past year has included the new stadium, field house and playing field for the Phillipsburg High School, Phillipsburg, N. J., the new "trajectory" tennis court building at Holmdel, N. J., and the new outdoor pools at the Country Club of New Canaan, Conn.

The Phillipsburg development is perhaps particularly noteworthy because of its neatness and completeness and because of the successful manner in which the various units harmonize with each other and with the school building nearby. The stadium, seating 5,300 spectators, forms the first unit of an ultimate structure of about 20,000 seats, and is located for the most part on an earth and rock bank directly in front of the school. As the bank diminishes toward one end of the stadium, the structure emerges from the ground and the space under the seating deck is utilized for rooms for spectators' conveniences. A small press stand, unusually efficient and complete for a structure of this size, is incorporated in a central feature of the rear wall.

The field house is similar in general character to the school building and gives the low rambling effect which was desired, preventing it from dominating the field which must necessarily form the center of interest. The building contains two complete suites of locker, shower, towelling rooms, etc., one for home teams and the other for visiting teams as well as a directors' office, supply and storage rooms.

The trajectory tennis court at Holmdel, N. J., is the third building of this type already completed from designs by Gavin Hadden, the other two being community and club projects, while this one is owned by an individual. The name "trajectory" is derived from the novel feature of this design, invented in this engineer's office, whereby the roof is formed to the approximate lines of the trajectory of the tennis ball in flight. This requires for a one-court or a two-courts building a roof spanning the longer dimension of the enclosure, but has a number of valuable advantages. The headroom provided over the various parts of the playing surface is definitely fitted to the varying requirements of the game; the volume enclosed is all that is required by the game and no more, thus eliminating the volume usually wasted, and making this type of building considerably more economical than the usual rectangular type; the form of the enclosure permits the whole court to be efficiently lighted during daylight hours by means of large vertical windows in the side walls, thus eliminating skylights with their maintenance troubles and their confusion of the view of the ball in its flight. The building shown contains also a small spectators' gallery, and small

(Continued on page 94)

The Trajectory Tennis Court Building at Holmdel

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Henry W. Taylor, Consulting Engineer, 11 Park Place, New York, has been retained to design and supervise the construction of a sewerage development for the village of Saranac Lake, N. Y. The work will consist of an extension to the existing trunk sewer from the point where the crude sewage now discharges into the Saranac River to the location of a sewage disposal site which has already been selected and purchased. Trunk lines in the main part of the city will also be examined and some of these mains may be enlarged. The sewage disposal plant will consist of preliminary treatment and include preliminary settling tanks, separate sludge digestion tanks, sludge beds, and an outfall sewer to the Saranac River at a point about 1½ miles below the location of the present outfall. The work to be installed during the coming season will probably cost about $125,000.

Consulting Briefs

W. C. Bernard & Co., 317 North 11th St. Louis, Mo., recently completed their duties as consultants in the redrawing of Milwaukee's condemnation and assessment laws. The new law has been written and submitted to the Council by Mark A. Kline, First Assistant City Attorney. Mr. Bernard also has appeared as expert witness in all condemnation cases for the City of St. Louis and in the valuation of the property of the Union Electric Light & Power Co., for rate-making purposes before the Missouri Public Service Commission recently.

William H. Adams, Consulting Engineer, 2539 Woodward Ave., Detroit, Mich., is supervising the structural work on the Union Building at the Ypsilanti State Normal School, the Michigan Masonic Home, Alma, Mich., and the first unit of the Louis Pasteur School, Detroit, Mich.

Edwin C. Finley, Tupelo, Miss., is at present engaged in the preparation of plans for the West Tombigbee Drainage Canal.

Willard L. Gorton, Box 1134, Boise, Idaho, is at present in charge of the construction of an irrigation project in Tashkent, Turkistan, U. S. S. R., for the Soviet Government. This extremely large project lies east and south of the Caspian and Aral Seas. Water is supplied to a large cotton and fruit raising section.

Russell Thayer, Packard Bldg., Philadelphia, Penna., will have charge of the New Jersey Sea-Level ship canal and the Delaware River Tunnel from South Philadelphia to Gloucester, N. J.

Moran and Proctor, 342 Madison Ave., New York City, are now working on plans for the foundations for the New Orleans Belt Line Bridge across the Mississippi River and for foundations for the new Post Office and Federal Building in Pittsburgh. Under their supervision the following construction has been carried on: foundations for the Walker-Lispenard addition, described in CONTRACTORS AND ENGINEERS MONTHLY, March, 1931; for an apartment house at 302 West 12th Street, N. Y.; for a building at 101 Wall St., New York City, and a building at John, Pearl and Platt Streets in New York City.

W. M. Rosewater, 3198 West 7th St., Los Angeles, Calif., reports that he is now in Salt Lake City, Utah, making a study of the problems, and their solution, involved in changing the digging depth from 60 to 100 feet for the Fairbanks Exploration Co.'s, Fairbanks, Alaska, 10-cubic foot placer mining dredge, which was designed by Mr. Rosewater in 1927 and 1928. Dredging conditions have changed and deeper ground located which make this change in digging depth desirable, if such a radical change can be made in an existing machine without excessive cost. The Fairbanks Co. is a subsidiary of the U. S. Smelting R. & M. Co.

George B. Gascoigne, 1140 Leader Bldg., Cleveland, Ohio, has recently made the following additions to his staff: R. F. Snyder, formerly in the City Engineer's Office at Springfield, Ohio, and W. M. Suteliffe, formerly in the City Engineer's Office at Bedford, Ohio. This firm is now working on plans for sewer and sewage treatment works at Medina, Ohio, and sewage works for Cleveland, Ohio. Under its supervision intercepting sewer construction in Medina, Ohio, is being carried on. This company was recently called as expert witness in the case of Chas. Malone vs. the Village of Willoughby, Ohio, Mahoning Valley Sanitary District vs. Grasselli Chemical Co., and Metropolitan Park Board vs. the Cuyahoga County Commissioners.

Water and Sewerage Projects of New York Engineer

Alexander Potter

PLANS and specifications have been prepared and a report has been submitted by ALEXANDER POTTER, 50 Church St., New York City, to the Village of Gouverneur, N. Y., for the construction of a water purification plant. It is anticipated that some action regarding the raising of the necessary funds for this project will be taken shortly and that the construction will begin this spring. An investigation and report is also under way upon the proposed additional water supply for the city of Santiago de Cuba.

There are under construction Contracts A and B of the Supplementary Joint Trunk Sewer for certain municipalities in Union and Essex Counties, New Jersey.

This project serves twelve municipalities. The work on the contract includes approximately 6½ miles of trunk sewer, the pipe from 75 to 81 inches and a twin sewer section, each sewer being 5 feet 8 inches and 4 feet 8 inches. The entire project, which is to include a treatment plant as well as a considerable amount of smaller sewer which has been previously constructed, will total in the vicinity of $7,000,000.

The major portion of this contract is situated in the City of Elizabeth near the Elizabeth-Linden City line. Bids were received in February for Contract C of the same project.

Mr. Potter presented a paper "Recent Observations on Pipe Linings and Pipe Coefficients" at the thirteenth Texas Water Works Short School held in January at Waco, Texas.

Power Plant Redevelopment

AN interesting project completed under the supervision of the JACOBSON ENGINEERING CO, 904 Plymouth Bldg., Minneapolis, Minn., was the transformation of a grist mill into a profitable hydro plant for the Neshonoc Light & Power Co., near West Salem, Wis. This company owned the existing development on the La Crosse River and a small grist mill about five miles downstream which was driven by two old water-wheels with power transmitted through gears and belts. There was an old wooden dam, with a 7 or 8-foot head available. The new installation includes a 170-horsepower, 138½-rpm James Leffel & Co. high speed water-wheel, mounted in a vacuum-type flume with a steel-plate draft tube. The wheel is controlled by a Woodward governor, and drives a 156-kva, 2,300-volt generator which is controlled by Pearson automatic-control equipment.

Two control wires run between the two plants and serve to start and stop the unit in the new plant and operate an indicator in the old plant, so that the operator in the latter knows at all times the operating conditions at the new plant. When the switch is thrown at the upper plant, the governor opens the gates, starting the wheel and generator. After the proper generator voltage is built up, automatic speed matching and synchronizing equipment is put in operation to match the frequency of the generator with that of the power system. Then the automatic synchronizer closes the switch connecting the generator with the power system at the proper phase relation.

The plant is simple in construction, utilizing as much as possible of the existing equipment, and is proving a worth while investment. It is the opinion of Lawrence H. Jacobson, who prepared an article on this subject for *Power*, that there are many existing plants where redevelopments can be made to prove profitable. Mr. Jacobson says, "A period has been reached in water power where much redevelopment is being done; more will be made in the future to realize the full value of these resources. Three major points to which attention must be given when redeveloping old water powers, if they are to be made financially successful, are proper construction, equipment suited to the stream, and automatic control. That all phases of construction may be carried out properly, an engineer should be selected who has had experience in the hydro-electric field."

Various Projects of Indianapolis Engineer

A REPORT from the office of CHARLES BROSSMAN, Consulting Engineer, Chamber of Commerce Building, Indianapolis, Ind., states that plans are being prepared in that office for an electrical distribution system for Auburn, Ind., sewage disposal for Berne, Ind., a water works supply line for Lawrenceburg, Ind., and a report and plans for extensions to the Lebourn sewage disposal plant. Plans were recently completed for a water works system supply line, 3 miles in length, for Delphi, Ind., bids for which were received November 25.

The construction of a sewage disposal plant for Marion County, Ind., a water works at Greenwood, a filter plant for Valparaiso and a new boiler plant for the Indiana Boys School at Plainfield, is being carried on under Mr. Brossman's supervision.

Seabrook Representative in Russia on Short Visit to America

ACCORDING to a recent report from the SEABROOK ENGINEERING CORP., 50 Church St., New York City, Major D. M. Forester, Chief Engineer, European offices of that company, has been in the United States upon a short business visit and vacation. Major Forester returned to Europe about the first of April to continue the work of this organization. The Seabrook Engineering Corp. acts as Technical Advisors to the Moscow State Highway Dept., the City of Moscow and other construction departments in the U.S.S.R.

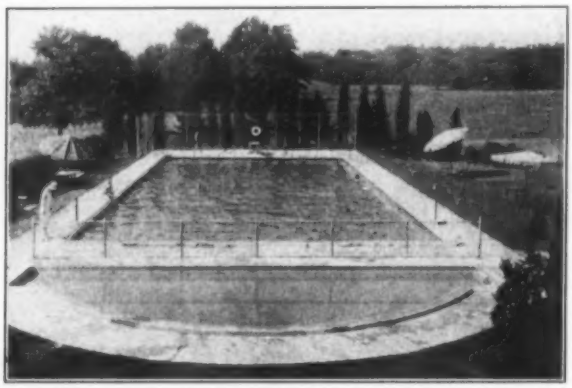
During the 1930 construction season the U.S.S.R. constructed 900 miles of graded earth roads, 200 miles of penetration asphalt macadam and 60 miles of asphalt paving in and around Moscow and they expect to more than double this amount of highway construction in 1931. The Seabrook Engineering Corp. also has other contracts in Russia and in other European countries. H. Eltinge Breed is its Consulting Engineer.

Noteworthy Athletic Plants and Stadia

(Continued from page 91)

dressing rooms and a lounge room in an extension at one side. In club buildings of this kind, particularly those housing two or more courts, these auxiliary facilities usually attain greater importance. The trajectory type of tennis court is arousing much interest among tennis players and engineers generally.

The pools at the Country Club of New Canaan, of which a general view is here shown, are perhaps chiefly distinguished by their picturesque setting and by their unusual economy of construction. The entire cost of construction of the pools and their platforms, and the filter house, not shown in the picture, containing complete equipment for recirculation, filtration and sterilization, was less than $19,000. The major pool, for swimming and diving, measures 35 x 75 feet in plan, with depths varying from 3 feet 6 inches to 9 feet; the smaller pool is for wading for small children and averages only a few inches in depth.



The Pools at the Country Club of New Canaan, Conn.

Gavin Hadden has also served as consultant on the new gymnasium and physical education buildings which were completed during the past year at Harvard University, Cambridge, Mass., and at the University of Rochester, Rochester, N. Y.

True Economy in Highway Bridge Design

WILL bridges that meet the present requirements fulfill the demands of the public fifty or even fifteen years hence? Fifteen or even ten years ago roads were located so the grades would be light, even where such location added to the distance traveled. With the high-powered vehicles of today the shortest distance is demanded and a steeper grade is permissible, with the result that some roads or parts of roads built only a few years ago are being relocated and costly bridges are being abandoned.

When one considers the true economy in highway bridge design he should take into consideration and give proper weight to all factors involved. Important among these is the measure of the ability and willingness of the public to pay, and continue to pay, when tax collections already amount to 12 per cent of the national income and the trend is upward.

It is the purpose of a booklet "True Economy in Highway Bridge Design" by T. W. Dodd, which is based on a paper presented at the Eighth Annual Convention of the American Institute of Steel Construction, to point out economies which may be brought about in building highway bridges by means of better analyses of the economic and engineering factors involved.

Mr. Dodd points out the various basic considerations involved in such an analysis, including a comparison of different designs and materials, the question of first cost and ultimate cost, of the economic span length both for the material used and for the structure as a whole, the cost of foundations, the utility value, the utility plus aesthetic value, and the material quantities of a bridge, the substructure, the supporting medium or span and the floor and railing. These various points are discussed in some detail, with tables and diagrams to illustrate the text. In conclusion, Mr. Dodd says:

"In pointing out how some economies in highway bridge design may be realized many phases of the subject have not been touched on. The studies show the need for a more thorough analysis of bridge design and a better knowledge of the materials of construction. It is unfortunate that the public and the engineers have not been supplied with accurate data on which to predicate the life and maintenance cost of all of the materials of construction. So long as this is true, individual judgment must govern and there are bound to be wide differences of opinion in this respect.

"In his work the engineer must be permitted to use a certain amount of judgment but with a lack of information this privilege may permit him to go beyond the bounds of reason."

Following Mr. Dodd's article there is a brief discussion of the subject by J. E. Greiner, Consulting Engineer. Copies of this booklet may be secured from the American Institute of Steel Construction, 200 Madison Ave., New York City.

Goodnough Enters Consulting Practice

ANNOUNCEMENT has been made by X. Henry Goodnough, who recently resigned as Chief Engineer and Director of the Sanitary Division of the Massachusetts State Department of Health, of the opening of an office in Boston, Mass., with Bayard F. Snow under the name X. HENRY GOODNOUGH, INC.

Mr. Snow has been engaged in private consulting practice for about one year, prior to which he was Resident Engineer for the South Essex Sewerage Board in Massachusetts.

Surveys for River Studies

THIS is the title of a paper being prepared by GERARD H. MATTHES, U. S. Engineers Office, Norfolk, Va., for presentation before the Surveying and Mapping Division at the April meeting of the American Society of Civil Engineers to be held in Norfolk, Va.

The object of the paper is to focus attention on a phase of river engineering which, in the last few years, has become very important in this country. In some respects it may be said to have developed into a special line of engineering which is concerned with the comprehensive economic development of rivers and river systems, including all that pertains to the improvement of navigable reaches, control of floods, development of power, irrigation and drainage.

The Editor Comments —

Spring and the Construction Season Have Arrived in the Northeast

In the northeastern section of the United States, construction is already in full swing. A long, but mild, winter, devoid of an undue amount of snow, except in western Massachusetts and other parts of New England, has permitted much work to progress without delay. That giant of modern bridge construction, the Hudson River span between New York City and New Jersey, has already felt the first dead load of its concrete roadway. New Jersey, alive to its great task of furnishing the western outlet for the flood of traffic which will be released at a new point on the Palisades, has many contracts under way for great fills across the marshes. A giant slash in the huge trap rock buttresses of the Palisades with minor scratches for cross roads mark the efforts of numerous contractors. Some of these "scratches" would seem major contracts, but for the mammoth size of other construction work close by.

A bad spot was found this winter within 1,000 feet of the Hudson River Bridge itself on one of the arteries leading from the structure. This is a "bottomless pit" which so far has been determined as at least 100 feet deep and into which wooden piles have been driven 60 feet and in less than 24 hours have been repelled 20 feet into the air. A 5-ton boulder on the morass disappeared in 3 days. Thousands of tons of rock have been dumped and have slowly disappeared with no apparent stabilizing effect on the quagmire. To try to stabilize this quaky pit well-points are being used to remove the water which is the lubricant of most such unreliable ponds of muck.

Close by the Holland Tunnel work has gone on all winter on an enlarged highway bridge over the Erie Railroad at Croxton Junction, N. J., where the main line of the Erie and the Northern Railroad of New Jersey join. Concrete piers have arisen during the winter amply protected by tarpaulins and erected on foundations made solid by the use of the well-point method. Concrete was proportioned and mixed alongside the track and a small industrial railway was operated from the batcher plant and mixer down a gentle slope to a narrow strip between a heavily traveled freight track and a concrete retaining wall. Two cranes handled the aggregate and moved the concrete from the industrial cars to the protected forms.

Pennsylvania and Points South and West

In Pennsylvania a large program of road construction is again to be undertaken. In 1930, the largest state highway program ever completed within the Keystone State was handled with little difficulty through the coordination of material and equipment men and contractors, following an earnest call for cooperation by the Chief Engineer of the State Department of Highways. Activity will be fully as intense during the 1931 construction season as during 1930.

South Carolina and Georgia are to continue their large construction programs started in 1930. Minnesota in the middle west is expanding its activities this year. Large hydro-electric projects are nearing completion in Pennsylvania and head and shoulders above all stands the colossal project of Hoover Dam, the mecca and hope of hundreds of contractors and thousands of skilled and unskilled laborers.

The Civil Engineering Contractor Is Relatively Well Off

We have outlined but a fraction of the work now getting under way throughout the United States and Canada. These are works which have come under our personal observation or have been brought especially to our attention. Construction keeps pace with the needs of America. It cannot absorb all the unemployed in our cities, because that labor is skilled in manufacturing and administrative tasks, but it can and has, as already mentioned in these columns, gone out of its way to help healthy able men in rural communities where these men could handle manual work on road jobs.

For the civil engineering contractor there has been little let-up in the volume of work. Arteries of transportation are ever being improved and new routes being created to take some of the burden from the older overtaxed highways. Thus the highway and grading contractor is generally far better off than his colleagues who rely on industrial construction where there has been a decided slackening of speed in the last year.

Let's Not Go to Russia

A few days ago I saw a letter from an American engineer who is now doing some very interesting research work for the U. S. S. R. in Moscow. He describes housing conditions in that city in a very interesting manner, stating, "Moscow is quite a wonderful city, but just now it is very badly overcrowded. Before the Revolution, it had a population of about one and one-half millions, but now it has close to three millions and practically no more houses to lodge the people in than when it was inhabited by the smaller number. The result is that many people are without lodging and are sleeping in the streets, in doorways, in alleys or wherever they can find a place to curl up. The great majority of people are living in one room per family with a favored few able to get two rooms. To obtain a room in a hotel without a very special permit is quite out of the question and every day I see hundreds of Russians making the rounds of the hotels looking for rooms, but they are almost never successful in obtaining one."

Theodore Reed Kendall

Fabricating the Floor on the Taylor Bayou Bridge in Jefferson County, Texas

Texas Bridge Has Welded Battleship Deck Floor Construction

A NEW and unusual type of bridge construction which involves the construction of an arc-welded battleship deck floor was recently demonstrated with the completion of a bridge over Taylor Bayou in Jefferson County, Texas. This new bridge consists of a swing section 161 feet long which is now complete, and two approaches, one 134 feet long, and one 96 feet long, which are to be constructed in the future. The swing section was constructed by the Coastal Construction Co., Orange, Texas. The bridge forms part of a highway between Port Arthur and Galveston, Texas, and spans a bayou near the Gulf of Mexico at West Port Arthur, Texas. It was constructed to conform with the state highway standards, that is, to maintain a live load of 150 pounds per square foot, and a dead load of 15 tons.

The floor of this bridge is fabricated of ½-inch Diamond floor plate arc-welded into place. The swing section covers an area of approximately 3,220 square feet and is fabricated of plates 20 feet long by 4 feet wide. These plates are spaced ½ inch apart for arc-welding to the flanges of the floor beam. The roadway is 18 feet wide and on the sides the plate turns up a distance of 1 foot to form the curb. This makes the roadway U-shape. The floor is made strong and rigid by arc-welding the plate to the flanges of the floor beams on the under side with fillet welds 3 inches long, spaced on 9-inch centers.

The arc-welding on this bridge floor was done with the Lincoln Fleetweld process of manual welding. This process utilizes the shielded arc and produces welds of great physical qualities through manual welding. Welds with a tensile strength of 60 to 75 thousand pounds that are very ductile and highly resistant to corrosion are possible with the shielded arc. The shielded arc process excludes nitrides and oxides from the weld metal while in the molten state, thus improving the structure of the weld.

The Completed Welded Flooring Showing the U-Shape with Integral Floor and Curb

The under structure of this bridge consists of two plate girders on either side and eight longitudinal floor beams. The plate girders are built up from 5/16 and ⅜-inch plate and 5-inch by 4-inch angles, with ⅜-inch plate, 18 inches wide tack-welded to the angles to form the flanges. At the center of the bridge this girder is 6 feet deep, at the ends of the swing section, 30 inches deep. All permanent stiffeners on this girder are arc-welded into place. The floor beams on the bridge are 18-inch, 52-pound I-beams, and the stringers are 10-inch, 21-pound I-beams.

The proposed approaches to this bridge are to be completed in the future. The existing approach on the North side is 88 feet 7 inches, while the proposed approach is 96 feet. On the South side the present approach is 136 feet 5 inches while the new one will be 134 feet.

Winter Construction of a Hydro-Electric Plant

(*Continued from page* 81)

was subjected to severe tests very shortly after being placed. One of the gatehouse piers was enlarged at the downstream end in order to deflect the flow in the 10-foot opening from the tailrace cofferdam. This concrete was placed when the air temperature was 40 degrees below zero, stripped within three weeks, and subjected to the full discharge of the river impinging on it at a velocity of over 12 feet per second within six weeks after it was placed. When the 10-foot opening was finally closed in September, 1930, this concrete was found to be still in perfect condition.

CONCLUSION

Construction of this plant started on July 1, 1929, and the first concrete was placed on October 25, 1929. The first unit was turned over on August 27, 1930, the transmission line was first energized on November 12, and the plant handed over to the Canada Northern Power Corp., Limited, on December 24, 1930, although construction was virtually complete in November. The entire project was designed by the Engineering Division of the Power Corporation of Canada, Limited; and built by the Construction Division of the corporation.

Speed in Levee Construction

THE third levee built by R. G. LeTourneau, Inc., near the Lake-of-Woods, has recently been completed. This levee, consisting of 215,000 cubic yards, was let to Hamstreet & Bell and later sublet to LeTourneau at 25 cents per yard. LeTourneau moved onto the job on October 29, 1930, with three carts and four scrapers and one bulldozer with eight Caterpillar Sixty tractors and a Bucyrus-Erie 50-B 4-yard dragline.

The weather was favorable and conditions generally good. Finishing the job on November 27, having lost only one day on account of rain, made just 25 days work or an average of 8,600 cubic yards per day of two shifts with an average haul of 400 feet. The large carts holding 16 yards when filled were loaded with the Bucyrus-Erie dragline using a 4-yard LeTourneau bucket. The scrapers carried 7 yards and this heavy equipment with welded disc wheels rolled over the levee, packing the ground sufficiently so that no tamping or other rolling was necessary. The bulldozer was used to trim the slopes and where other spreading was necessary.

The Plant Set-Up for the Woodstock Slag Corp., Birmingham, Ala., Showing the Arrangement of Bin and Mixers

Simultaneous Operation of Two Mixers Under One Bin

A SLIGHT change in their plant set-up has enabled the Woodstock Slag Corp., Birmingham, Ala., to operate two mixers simultaneously under one bin, with as short a mixing time as one minute. This company has for several years produced ready-mixed concrete for contractors in and around Birmingham and the new set-up has practically doubled the plant capacity.

The original plant set-up included a 4-compartment bin, one weighing batcher and two T. L. Smith tilting mixers. The 28-S and 56-S mixers were placed back to back. With this arrangement, it was possible to operate only one mixer at a time, unless an exceedingly long mixing time was specified. It was impossible to add another weighing batcher without completely redesigning the bin.

By building chutes from the four bin compartments directly to the mixer hopper and installing a Smith 56-S Weigh-Mix in place of the 28-S mixer, the owner was enabled to operate both mixers at the same time, even with a one-minute mix. The weighing hopper proportions the batch for the one mixer and the Weigh-Mix for the other. The change in the set-up involved but very little additional expenditure and yet it enabled the owner to double his concrete production.

Here's Frost for You

CONSTRUCTION work in Canada in the far north and northwest is attended by difficulties due to the severity of the climate, particularly when excavation is necessary, according to a recent article on work in north Manitoba, published in the *Canadian Engineer*. In some sections, even in summer, the ground thaws out only for a few inches and is permanently frozen below that limit.

Last summer a contract was awarded to the McNamara Construction Co., 52 Yonge St., Toronto, for the construction of sewers and a water distribution system in the town site of Sherridon, located in northern Manitoba, north of 55 degrees latitude, a country which has developed considerably in recent years because of the mining industry. During the construction the contractors encountered many difficulties, mainly owing to permanent frost in the ground in many parts of the work, all of which had to be blasted and in many cases formed the overburden of rock which had to be removed. The condition of blasting out frost and then continuing through rock when the temperature was often as high as 90 degrees with sunshine lasting as many as 16 hours a day would be a novelty for most contractors.

A great deal of equipment was necessary and on account of the extreme cold a minimum of 9-foot covering was required on all water pipes and house connections, making some of the excavation, very deep. Two gasoline clamshells, one a 1-yard Northwest shovel with hoe attachment and a Bearcat shovel, were used for stripping, digging and backfilling. Three portable compressors, a Sullivan and two Canadian Ingersoll-Rand machines, supplied the air for drilling, this work being carried on continuously.

Sutcliffe & Co., New Liskeard. were the consulting engineers for the Sherridon Development Co. and C. V. Caswell was in charge of the work for the McNamara Construction Co.

Portable Crushers Produce Good Yardage for Wisconsin Contractor

AUGUST C. KOPPLIN, a Wisconsin contractor, has been using a Good Roads Crushermobile for the production of ¾-inch stones for road work. He has had no difficulty in producing from 1,500 to 2,000 cubic yards per week, and has crushed 355 cubic yards of ¾-inch material per day. On three occasions last year his daily production was in excess of 400 cubic yards of 1¼-inch material. This machine often makes two or three moves per week from one gravel pit to another and this seldom requires more than two or three hours. Last year he made eighteen moves during the season. He made one move of 16½ miles from one pit to another in one day and in addition produced 206 cubic yards of material that same afternoon at the new location. He uses a ¾-yard Universal shovel for charging the machine.

The accompanying illustration shows an interesting set-up of one of these portable crushers owned by Earl Seymour. It will be noted that the crushing plant is readily backed up to the shovel which is supplying the plant proper and the delivery of the stone is made direct to the truck in the right foreground.

One of the Good Roads Crushermobiles Owned and Operated by Earl Seymour

Construction Industry News

Byers Machine Co., Ravenna, Ohio, has recently appointed the Superior Construction Equipment Co., 1850 South Kostner Ave., Chicago, Ill., as its distributor for the complete line of Byers 1¼ to ½-yard shovels, cranes, draglines, trenchers and skimmers, as well as the models 40 and 50 small shovels and cranes of the Byers Excavator Co. line.

American Chain Co., Inc., Bridgeport, Conn., has announced that its subsidiary, the American Cable Co., has concluded negotiations with the American Steel & Wire Co., a subsidiary of the United States Steel Corp., to manufacture pre-formed wire rope under a license agreement, the patents covering this material being owned by the American Cable Co. In addition, the company has concluded license contracts for the manufacture of this material with the General Cable Co.; five leading rope manufacturers in Canada; British Ropes, Ltd., and its various subsidiaries, the largest manufacturers of wire rope in the United Kingdom, together with four other companies in Great Britain; Australian Wire Rope Works, Ltd.; and Gelten & Guilleaume, the largest producers of these products in Germany and continental Europe.

Fairfield Engineering Co., Marion, Ohio, has announced the appointment of H. J. Burekart as its Chicago representative, located at 1922 Transportation Building, 608 South Dearborn Street. Mr. Burekart has had a wide experience in the handling of portable machinery as well as stationary units.

Bay City Shovels, Inc., Bay City, Mich., has removed its eastern office from 302 Broadway, New York, N. Y., to 9 Westfield Ave., West, Roselle Park, N. J., where it will be operated in conjunction with the eastern warehouse and service station of Bay City Shovels, in charge of E. P. Reading, Eastern Sales Manager.

This company has also announced that arrangements have been made with John Inglis Co., Ltd., Toronto, Ontario, for the manufacture of Bay City convertible power shovels, cranes and excavators in Toronto. The sale of Bay City equipment manufactured in Canada will be continued through the present Canadian distributors of Bay City Shovels, Inc., under the supervision of the home office at Bay City, Mich.

Nelson S. Greensfelder, Advertising Manager, Hercules Powder Co., Wilmington, Del., a nationally known authority on industrial advertising, died on April 5, after a short illness which developed into pneumonia. Mr. Greensfelder has been prominent in many national and local technical and civic organizations.

O.K. Clutch & Machinery Co., Columbia, Pa., has appointed the Herbert G. Gass Co., 207 Main St., Greenfield, Mass., as its New England distributor for O.K. hoists, air compressors and portable elevators.

Lidgerwood Manufacturing Co., Elizabeth, N. J., has recently announced the appointment of new distributors including Hedge & Mattheis Co., Boston; Brown-Bevis Co., Los Angeles; Edward R. Bacon Co., San Francisco; Funkhouser Equipment Co., Kansas City, Mo.; and Thorman W. Rosholt Co., Minneapolis, Minn.

The Bucyrus-Monighan Co., Chicago, Ill., is the new name for the Monighan Manufacturing Corp., the controlling interest in which was recently acquired by the Bucyrus-Erie Co., Milwaukee, Wis. This company will continue to operate as a separate organization except that sales will be handled by the Bucyrus-Erie sales organization. W. W. Coleman was elected Chairman of the Board of Directors and G. A. Morison, Vice Chairman, in addition to which the old officers were reelected as follows: O. J. Martinson, President; W. T. Brennen, Vice President and Treasurer, and H. W. Vose, Secretary.

The Lincoln Electric Co., Cleveland, Ohio, has announced the removal of its Chicago office to a new building at 1455 West 37th St., from 53 West Jackson Blvd. This company has also announced the appointment of George G. Landis as it Chief Engineer.

The National Lime Association, 927 Fifteenth St., N.W., Washington, D. C., has announced the appointment of Lee S. Trainor as Chief Engineer of its Construction Division.

Barber-Greene Co., Aurora, Ill., has announced the following appointments: E. H. Cooper to be Ditcher Line Head for the Western Division; the territory formerly served by Mr. Cooper as Manager of the Kansas City office is now divided between the Kenney Machinery Co., 2301 Grand Avenue, Kansas City, Mo., and the Buda Engine Service, 521 West Archer St., Tulsa, Okla. Two new branch managers are announced, Frank Ness at Philadelphia, and D. H. McLean at Cleveland.

Conco Crane & Engineering Works, Division of H. D. Conkey & Co., Mendota, Ill., has appointed C. P. Maxson, Auditorium Garage Building, Cleveland, as its representative in that territory and Starr-Carpenter, Parks Building, Pittsburgh, Pa., as the representative in the Pittsburgh territory.

Northwest Engineering Co., 28 East Jackson Blvd., Chicago, Ill., has announced the appointment of V. L. Wheeler as Chicago district manager. Mr. Wheeler has a broad experience in the shovel field, having been with the Thew Shovel Co. for some years in various parts of the country.

Wire Reinforcement Institute, National Press Building, Washington, D. C., has announced the appointment of James S. Burch, as Research Engineer. Mr. Burch was formerly a member of the technical staff of the American Road Builders Association, acting as investigator for the Special Committee on Subgrades and Pavement Bases. The Institute, under the direction of Royal D. Bradbury, provides a centralized organization to exploit the technical and utilitarian merits of electrically welded wire fabric for reinforcement of concrete pavements and in building construction.

Link-Belt Co., 910 South Michigan Ave., Chicago, Ill., has announced the appointment of the McFarland Tractor & Equipment Co., St. Joseph, Mo., as its agents for the sale of Link-Belt cranes, shovels and draglines in Atchison and Doniphan Counties in Kansas and the 17 counties in northwestern Missouri around St. Joseph.

Street Bros. Machine Works, Chattanooga, Tenn., has recently appointed Garlinghouse Bros., 2044 Santa Fe Ave., Los Angeles, Calif., as its southern California distributor for Street Bros. hoists, derricks, cableways and slackline excavators.

Butler Bin Co., Waukesha, Wis., has announced the appointment of H. W. Butler, Rochester, N. Y., as its Eastern Field Representative and Sales Engineer. Mr. Butler was formerly General Superintendent of Whitmore, Rauber & Vicinus, Rochester, N. Y.

Distributors' Bulletin Board

The distributors of construction equipment listed below have made changes in their cards appearing in the Distributors' Directory on pages 143 *to* 160 *of this issue of* CONTRACTORS AND ENGINEERS MONTHLY:

Arkansas Tractor & Equipment Co., Little Rock, Ark.
Thomas L. Barret, Louisville, Ky.
Bluefield Supply Co., Bluefield, W. Va.
The Bond Co., South Boston, Mass.
Graham B. Bright, Richmond, Va.
Central Tractor & Equipment Co., Sioux Falls, S. D.
Connelly Machinery Co., Billings, Mont.
De Huff & Hopkins, Philadelphia, Pa.
Garlinghouse Bros., Los Angeles, Calif.
R. L. Harris, Inc., Knoxville, Tenn.
J. L. Hart Machinery Co., Tampa, Fla.
L. Z. Howell, Chicago, Ill.
J. Shuman Hower, Utica, N. Y.
Hunter Machinery Co., Detroit, Mich.
R. H. Hyland Co., Chicago, Ill.
Interstate Machinery & Supply Co., Omaha, Neb.
Kipp-Kelly, Ltd., Winnipeg, Canada
Llewellyn Machinery Corp., Miami, Fla.
Midwest Locomotive Works, Hamilton, Ohio
Peoria Tractor & Equipment Co., Peoria, Ill.
Shearer & Mayer, Indianapolis, Ind.
Standard Road Equipment Co., Rockford, Ill.
Superior Construction Equipment Co., Chicago, Ill.
John R. Tinklepaugh, Albany, N. Y.
Western Material Co., Sioux Falls, S. D.
Wilson-Weesner-Wilkinson Co., Nashville, Tenn.

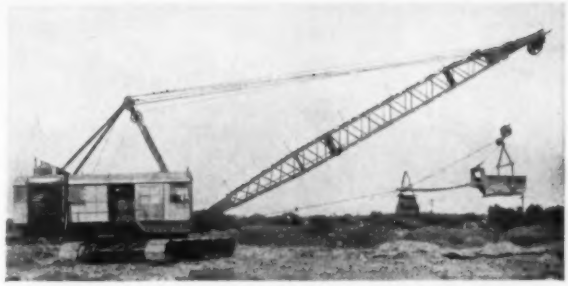
A New 3-Yard Diesel Dragline

TO meet the requirements of use on levee building, drainage work, or sand and gravel loading and stripping under soft ground conditions, a new 3-yard diesel dragline has recently been developed by the Bucyrus-Erie Co., South Milwaukee, Wis. This Bucyrus-Erie Class 111 dragline offers the economy and power of a 6-cylinder full-diesel engine, combined with fast operation, accessibility, ease of control and freedom from repairs. It has a long, wide-spread crawler mounting that provides for low pressure bearing and maximum mobility.

Entire control of all operating motions, including hoist clutches and brakes, drag clutches and brakes, swing, steering and main clutches, is by air, through valves controlled by small, easily operated hand levers and pedals grouped in front of the operator's position. Air is supplied by a small compressor built into the engine. The propelling jaw clutch and the power boom hoist are the only manual controls.

Mounted transversely across the rear end of the revolving frame, the 6-cylinder Atlas diesel engine drives the machinery through a silent, spur-gear transmission entirely enclosed and running in oil. Each gear shaft of this transmission is mounted on two anti-friction bearings. All gears have special Maag silently running teeth. A fully-enclosed triple dry-disc main clutch drives the machinery from the transmission. The two large diameter grooved drums with their large outside band clutches and large area outside band brakes are arranged one behind the other, making them easily accessible.

The swing machinery and the propelling machinery are not interlocked so that the operator can swing and propel at the same time. Immediately in front of the drag drum is the reversing bevel gear and the double jaw clutch unit of the propelling machinery. This reversing unit drives a short vertical intermediate shaft, which in turn drives the vertical propelling



The Bucyrus-Erie Class 111 *Diesel Dragline*

shaft extending through the center pintle to the underside of the base. At the front end of the revolving frame is the swing machinery with its two large diameter cone clutches. This swing unit, controlled by the sliding of a single shaft which carries one-half of each of the two clutches, permits the operator to swing, drift, plug and reverse with a single control lever. The whole unit is mounted in a rigid steel casting, insuring permanent alignment for the bevel gear assembly. The bearing of the vertical swing shaft extends below the revolving frame, and supports the shaft right up to the hub of the pinion. Just behind the hoist drum is a worm-driven boom hoist taking its power, through a hand-operated jaw clutch and a bevel gear unit, from the spur gear that drives the hoist drum shaft.

On the front end casting of the revolving frame is mounted the Bucyrus-Erie fairlead with its large diameter, rope-saving sheaves. This fairlead reduces the number of bends in the drag rope to the minimum and provides proper lead to the drag drum, regardless of the bucket's position. The lattice-type box boom with parallel sides has strength without excess weight and allows the operator to see his work. The boom is built so that sections may be added or removed and the swivel sheaves at the boom point make for long rope-life. The new Bucyrus-Erie cast bucket is standard equipment on this machine. It is a heavy-duty bucket with the weight of an ordinary light bucket.

Both the base and the revolving frame are constructed of structural steel with stiffeners welded in at points of concentrated loads. Two deep longitudinal girders form the backbone of the frame and carry the main machinery. Across the front end and fitted into the frame is a heavy steel casting that contains the boom foot sockets, fairlead shaft supports, bearing for the vertical swing shaft and connections for the A-frame.

PUTTING SAFETY INTO A SLIPPERY SIDEWALK

A Cincinnati contractor cut a series of rings on a dangerous strip of sidewalk 75 *feet long and* 12 *feet wide using a* 1931 *Model Berg Hi-Way Surfacer, made by the Concrete Surfacing Machinery Co.,* 4667-69 *Spring Grove Ave., Cincinnati, O.*

A Model 17 1-Yard Keystone Whirler Equipped with a 1-Yard Skimmer Bucket

A New Convertible Power Shovel

A CONVERTIBLE power shovel which is full-revolving and full-crawler mounted and is equipped with all standard excavating buckets and attachments has been announced by the Keystone Driller Co., Beaver Falls, Pa. It is known as the 1931 Keystone Model 17 machine and weighs 28 tons complete with skimmer, pull-scoop or clamshell, and 30 tons with the standard bank shovel. While offered as a general purpose 1-yard revolving machine, it has been designed to give exceptional efficiency with the skimmer-scoop for street and highway excavation and with the pull-scoop or backhoe bucket in ditching.

Stability has been achieved by mounting the machine on a very large roller path 71 inches in diameter with hold-down shoes which tie the upper structure to the crawlers. This reduces the tendency to oscillation and makes it possible to accurately control and finish the grade with the skimmer bucket. The 21-foot boom provides a horizontal crowding movement of 14 feet 9 inches, so that the bucket can readily be filled in a 4 or 6-inch cut in one crowd. This adapts it for grading streets and for shallow excavation where the standard shovel would be at a serious disadvantage. Since the machine will excavate over a radius of 28 feet 6 inches, it is possible to cut and finish a grade from curb to curb in a street 50 feet wide by one set-up.

It is claimed that the 1-yard bucket gives the machine a capacity of over 800 cubic yards per 10-hour day in any ordinary excavation and the full-revolving feature makes it possible to handle deep cuts to advantage, loading the bucket in front of the machine and dumping it at the rear.

A full range of pull-scoop buckets from 24 to 72 inches is available on this unit. Sizes from 24 to 48 inches are standard and have capacities from ½ yard to 1 yard over this range. Three other size buckets are available, 54-inch, 60-inch and 72-inch, which will be found satisfactory and profitable where work is required in these widths, and with a little care may be readily handled by the same machine. The shovel has a digging depth capacity of 20 feet and an extreme depth reach of 24 feet and an extreme reach at ground level of 25 feet 6 inches from the center pin. The dumping height of the ditcher bucket is 11 feet and the dumping clearance with the skimmer bucket is 15 feet.

The boom and digging buckets for the skimmer-pull-scoop operation are exceptionally light. The boom weighs 2,500 pounds and the 1-yard skimmer or 48-inch ditcher with attachments about the same. Thus the dead load on the front of the machine is about 5,000 pounds or about one-half the weight ordinarily found in boom and bucket on a machine of the same capacity. This makes it possible with a moderate amount of counterweight to keep the rear end clearance or tail swing of the machine within the limit of 8 feet 6 inches from the center pin.

The power unit is a Climax Blue Streak engine developing 83 horsepower at 960 rpm. The traction speed is 75 feet per minute and the rotation speed 5¼ revolutions per minute. The gas consumption is about 45 gallons per 10-hour day.

A New Dial-Scale Weigh Hopper for a Bucket Loader

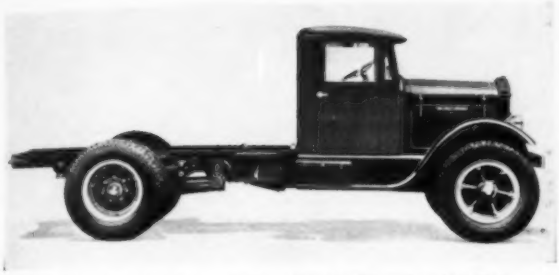
A NEW dial-scale weigh hopper that will weigh within 0.4 of 1 per cent even while the bucket loader on which it is mounted is operating at an angle of 4 degrees has been announced by the Barber-Greene Co., 485 W. Park Ave., Aurora, Ill. This weigh hopper is used with the newly announced Model 62 super bucket loader, a crawler-mounted, self-feeding, one-man-operated machine with a capacity of 62 cubic feet per minute.

The weighing unit built into this hopper is an American Kron scale. The dial on the scale is graduated into 2-pound units and is provided with two markers which may be set to indicate the desired reading. Directly above the weigh hopper is a small auxiliary hopper holding approximately 360 pounds of material. At the top of the weigh hopper itself is a sliding horizontal gate controlled from the operator's platform by a chain. When the indicator hand on the dial scale is near the desired weight, the sliding horizontal scale is closed, allowing the auxiliary hopper to fill up. By working the sliding gate with the chain, the material is allowed to feed from the auxiliary hopper into the weigh hopper until the required batch is present.

The weigh hopper will weigh batches up to 3,600 pounds, not to exceed 32 cubic feet in volume. In actual operation at Brockton, Mass., the loader and weigh hopper were able to load trucks consistently at a rate of three 1,100-pound batches in 50 seconds, the operator in each case coming within 3 pounds of exact weight.

The loader on which this weigh hopper is mounted is equipped with the standard overload release sprocket for the protection of the machine against strains due to an overload on the bucket line and an overload release sprocket on the crawler drive to protect the machinery there. It feeds itself by means of two 42-inch discs that lie flat on the ground and revolve inward, crowding the material into the buckets. An adjustable scraper directly behind the feeding discs clears a path 7 feet 6 inches wide, the overall width of the machine.

The New Barber-Greene Dial-Scale Weigh-Hopper on a Model 62 Super Bucket Loader



A New Pierce-Arrow 5-Ton Truck Chassis with Cab

A Complete New Line of Medium and Heavy-Duty Trucks

A COMPLETE new line of flexible medium and heavy-duty trucks, including five models with a range of 12,000, 18,000, 28,000 and 34,000 pounds vehicle gross weight, as well as a special 34,000 pound six-wheeler for extra heavy duty, has been announced by the Pierce-Arrow Motor Car Co., Buffalo, N. Y. The new 2-ton, 3-ton and 5-ton units are offered in three wheelbases, 160, 180 and 200 inches for the 2-ton and 5-ton series, and 150, 170 and 190 for the 3-ton chassis. The 8-ton unit is offered in two wheelbases, 168 and 204 inches. Save for capacity, wheelbase, frame dimensions and double rear wheels, the specifications of the six-wheeler correspond to the specifications of the 5-ton chassis.

Engines throughout are 6-cylinder L-head type of Pierce-Arrow design and varying power. The pistons and connecting rods are matched in sets for true balance. The valves are of specially selected steel. The heavy crankshaft, drop forged from selected steel, statically and dynamically balanced, is carried in 7 large bearings with extra heavy crank cheeks.

The engine and transmission are combined in one unit on the 2-ton and 3-ton chassis. All other models have the transmission mounted amidships. The engine is supported at the rear in strong frame brackets and in front on a sturdy arched steel trunnion which provides flexibility, yet assures rigid three-point suspension. The distributor, generator and starter are mounted on the engine. Dual ignition, consisting of two complete firing units which provide maximum fuel efficiency and greatly increased power, is used in all chassis with the exception of the 2-ton series. Fuel, oil and air filters render the engine dirt-proof.

Lubrication is force feed to main, connecting rod and camshaft bearings, as well as to the helical gears in the timing train. An impeller type fuel pump is driven from the camshaft. The downdraft carburetor is equipped with an air cleaner and crankcase breather.

The clutch is the two plate dry disc adjustable type with fully enclosed pilot ball bearings in the flywheel. On the 5-ton and 8-ton chassis driving and braking strains in the worm drive are absorbed by a heavy torque arm pivoted at the axle. On the 2-ton and 3-ton the drive is taken through the radius rods and the braking through the springs.

Transmission is of the selective type, four speeds forward and one reverse. All gears and shafts are of alloy steel with ball bearings used generously throughout the system. The front axle consists of a drop forged I-beam section designed to safely carry heavy loads and resist braking stresses. The rear axle is full-floating with special alloy shafts which carry the driving tongue only. Steering is easy and is obtained through a worm and trunnion block steering gear which provides maximum maneuverability in traffic.

Powerful four-wheel brakes, mechanical on the 2-ton, and Westinghouse air brakes on the 3, 5 and 8-ton, assure ample protection under all conditions. The frame of heavy channel steel with side flanges is specially heat treated for extreme toughness. Carbon steel is used on the 2-ton chassis, and chrome nickel steel on the remaining units. Semi-elliptic front springs are shackled at the rear. Heavy rear springs are shackled front and rear and are equipped with an auxiliary spring connected with heavy brackets on the frame. Cast wheels of sturdy design are equipped with heavy-duty truck tires. Dual rear tires are standard throughout. Balloon tires are standard equipment on the 2, 3 and 5-ton models. On the 8-ton series dual solid wheels are standard equipment.

Dipper Fronts with Scraper Blades

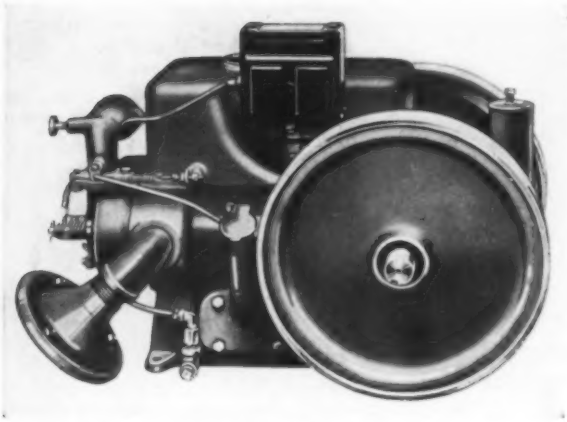
THE American Manganese Steel Co., Chicago Heights, Ill., has been granted an exclusive license by Grover C. Voit, Hopedale, Ohio, to manufacture and sell the Voit dipper front covered by U. S. Patent 1,719,576. This front, while of the general design used ordinarily on power shovel dippers, has as its distinctive feature a provision for several scraper blades on the outside, one of them running transversely at the heel of the front, and two in a V-shaped arrangement farther toward the lip. There may be additionally a longitudinal one between the V-blades, still farther up.

The sockets holding the scraper blades are cast integrally with the front, and the blades are held in place by wedge-shaped parts riveted into the socket alongside the scraper blades.

While first designed for coal stripping, this front can give a uniform grade in street or road work, leaving a smooth, clean bottom to receive the paving material. It also works out well in cutting slope in road building. Voit fronts in such work would require only the transverse scraper at the heel of the front. A dipper so equipped does not need to be dropped back as far as with a plain front for cleaning up. This eliminates the possible breakage of teeth and shipper shaft pinions that sometimes results from dropping the dipper far back and on the point of the teeth.

Voit fronts of Amsco manganese steel can be made for any dipper, although for the Vanderhoef design only the transverse rib is supplied.

A Dipper Equipped with a Voit Front



The New Hercules Model J Enclosed Engine

A New Enclosed Self-Oiling Industrial Power Unit

THE new Model J enclosed engine designed to offer maximum portability through its minimum weight per horsepower has been announced by Hercules Products, Inc., Evansville, Ind. The overall dimensions of the engine producing 2 horsepower are 18 inches wide, 27¼ inches long and 18 inches high while the 3½-horsepower unit occupies a space 25 inches wide, 34 inches long and 20⅛ inches high.

This new self-oiling engine is designed with as few mechanical parts as possible. All adjustments are easily accessible, the magneto has a retard lever to use when starting and the carburetor has but one fuel adjusting valve, making for simple control. The flywheels are of the safety disc type evenly balanced to eliminate vibration. The flywheels are provided with a guard over the crankshaft key as required by a number of safety industrial commissions. The engine starts easily and quickly under all climate and weather conditions. The carburetor is of the positive suction feed type with an automatic air intake which permits rich mixture which is so necessary in starting.

The new Hercules enclosed engine is equipped with a Wico high tension magneto which is tripped by a push rod operating from an eccentric on the camshaft. The magneto is not affected by moisture and provides the same hot spark for starting as when the engine is running at maximum speed. All of the mechanical parts requiring lubrication in this engine are operated in a bath of oil inside the crank case. There are no grease cups to fill or other exposed parts to lubricate except for an occasional drop of oil on the magneto breaker points as the oil in the crank case automatically lubricates the operating mechanism through the splash system.

This engine is particularly designed to operate pumps, paint spray equipment, saw rigs, concrete mixers, and tree spraying outfits.

Boring Horizontal Holes Under Pavements

A NEW device known as the Hydrauger has been announced by the Hydrauger Corp., Ltd., 1298 Bryant St., San Francisco, Calif., which, it is claimed, will drill horizontally under a street or highway and accurately control the direction of the bore. These machines bore a straight, clean hole through the soil and in over 90 per cent of cases at distances of 40 feet the auger has come out within 2 or 3 inches of the spot at which it was aimed.

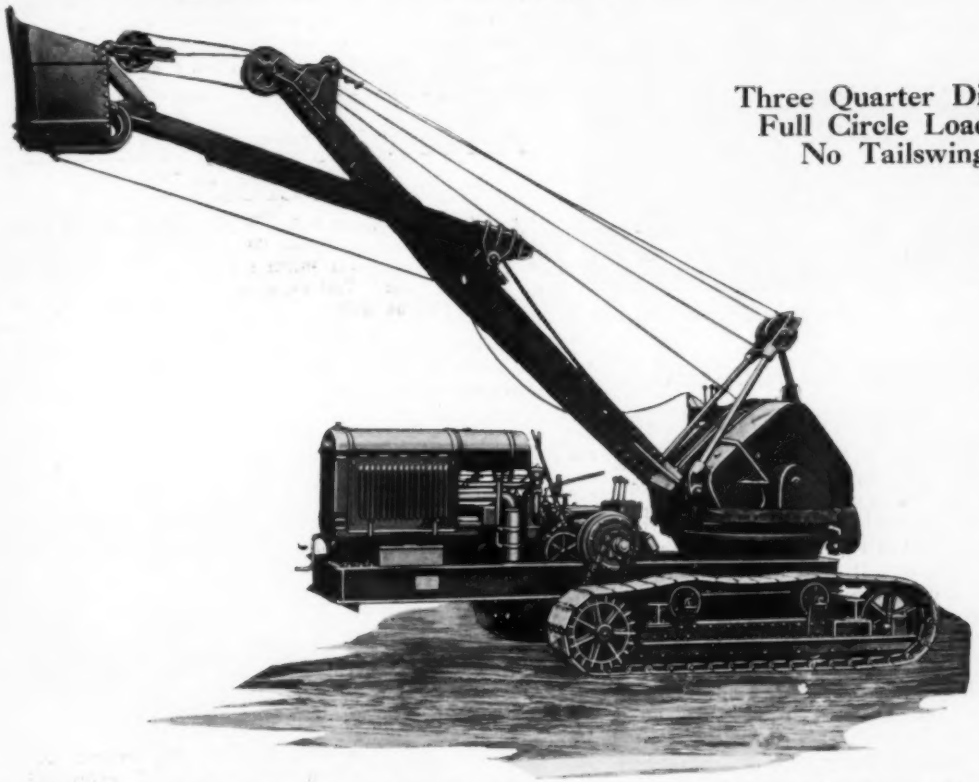
Model 2-A of this machine in actual operation has drilled under a 45-foot street in 18 minutes and under a 90-foot street in 40 minutes, including the time required to add boring-bar extensions. It eliminates the necessity for tearing up pavements or gardens except for two relatively small pits, one to receive the machine, and the other at the end of the bore.

The Hydrauger is driven by compressed air and connected with running water which passes through the boring-bar, issuing in two streams at the auger. The water washes the borings back, acting as a lubricant and leaves a clean, straight hole. So little water is used that it can be obtained by connection with an ordinary domestic faucet or fire hydrant with as low a pressure as 30 pounds. Where no piped water is available, the water may be transported in a barrel and circulated by means of a small air-driven pump.

Feed ahead is accomplished by a simple and strong reversible ratchet. After boring is completed the permanent pipe may be pushed in by hand or the machine ratchet may be used to pull in either the permanent pipe or a cable. A swivel is furnished with each machine for this purpose.

Boring Under a Wide Street with a Hydrauger

Finger-Tip Control



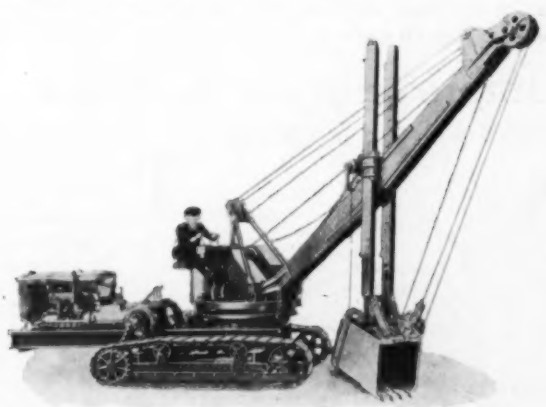
Three Quarter Digging
Full Circle Loading
No Tailswing

THE MICHIGAN POWER SHOVEL is the simplest, most easily handled power shovel on the market today. Finger-tip control on three little levers is all that is needed to operate this speedy, full swing shovel. The new hydraulic clutch control is an outstanding improvement. It assures this finger-tip manipulation at all times—greatly increasing speed of operation and the operator's efficiency. Only slight finger pressure is needed, and there is no fatiguing effort.

Another outstanding improvement is the full swinging feature. The turn-table mechanism, with the boom and dipper, is full revolving, but the power plant remains stationary. This arrangement increases speed and efficiency, because the weight of the power unit is not moved with each operation.

The operating width of the shovel is considerably less, permitting much narrower cuts than the old type machine with the swinging power plant. The full swinging feature permits loading immediately behind the shovel, and saves time in moving the machine up to the work.

Flexibility of movement from place to place is another important feature. New variable pressure control valve affords easier operation of the shovel, and positively will not stall the motor. This valve makes it possible to drive the machine independently of the turn-table mechanism. Steering is greatly simplified.



A ⅜ cu. yd. dipper is standard on the Michigan Power Shovel. Crane, clamshell bucket and trench hoe attachments can be used readily. Powered by a 35 HP. Power Unit.

Write or Wire for Bulletin "C" for complete specifications.

FULL CIRCLE LOADING — TRIPLE QUARTER DIGGING — NO TAIL SWING

MICHIGAN POWER SHOVEL CO.
BENTON HARBOR - MICHIGAN

MICHIGAN POWER SHOVEL CO.
Benton Harbor, Michigan

Gentlemen:

Please send without obligation circulars and prices.

Name .....

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C&E4-31

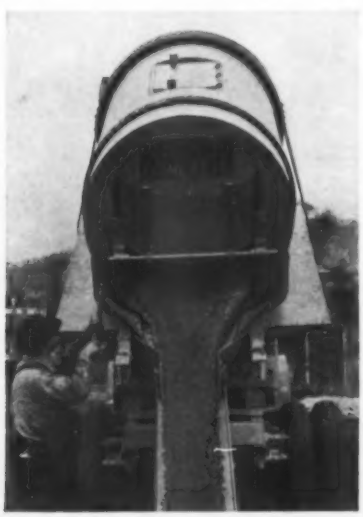
Ersted Hyster Scrapers in Action on a Fill Across a Lake

A Tractor-Operated Scraper

A HEAVY-DUTY scraper which speeds up work, lowers cost and enables contractors to bid lower and make greater profits, has been announced by the Willamette-Ersted Co., Portland, Ore., in the Hyster scraper. This scraper really cut or digs, instead of merely scraping, getting its load and starting its trip quicker. It carries the full load on wheels backward or forward due to the full bottom construction. It dumps the load where desired, and backs over fills to the dumping point without losing any of its load. It spreads the load uniformly and the wide spaced wheels in back compact the fill.

The operation of the Hyster scraper is simple. The cutting blade of the bowl is thrust into the ground by hydraulic pressure and by reversing the pressure on the ram, it is raised to carrying position. When conditions are favorable, the bowl can be left in its loading position, pushing an additional load before it and increasing the pay load as much as 50 per cent. Dumping is controlled entirely from the driver's seat by simply pulling on the trip lever. The driver alone operates the scraper, handling the entire operation while the tractor is in motion, without leaving his seat.

Improvements in Truck Mixer



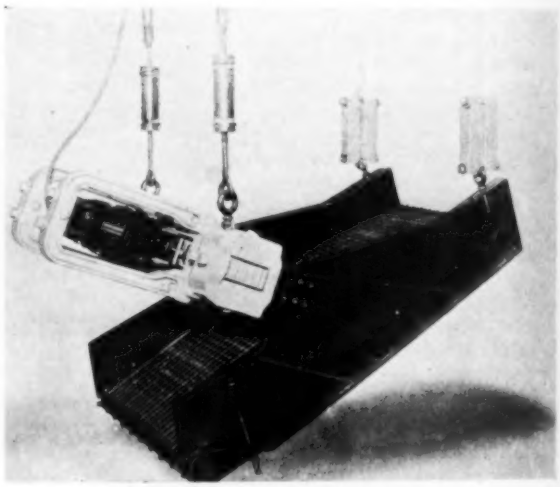
The 3-Yard Clinton Concrete Conveyor-Conditioner

THE 3-yard Clinton concrete conveyor-conditioner made by Clinton Motors Corp., Reading, Pa., has had several recent developments. The conveyor-conditioner body is mounted on a heavy-duty Clinton truck and is equipped with a Wood Hi-Lift hoist. The discharge door has been increased in size to 16 x 34 inches which is practically twice the size of the previous rear opening door. In making this change the rear trunnion and bridge supports were removed. This tends toward easier operation of the discharge by the driver. The rear of the tank is now mounted in a heavy steel cradle that revolves on roller bearings. The large discharge opening makes it possible to easily discharge any slump concrete required.

The Clinton truck on which it is mounted has more power, seven speeds forward, two reverse and is equipped with pneumatic tires, electric starting and lighting and a closed cab.

A New Type of Vibrating Screen

A SCREEN which brings a number of new and interesting practices to the art of screening, has been announced by the Traylor Vibrator Co., 1400 Delgany St., Denver, Colorado. The Trayco Conveyanscreen has a power unit, designated as the vibrator unit, mounted above the screen sash and which imports its vibration at an angle to the screening plane. This rapid oscillation produces a sharp screening action as well as a conveying motion. Thus, the screen can be operated practically flat and therefore does away with the necessity of setting the screen at an angle where gravity will cause the flow of the material across its surface. It is claimed that the Conveyanscreen produces a more accurate sizing because the angle of vibration causes the material to keep in closer contact with the screen cloth.



A Single 6-Foot Trayco Conveyanscreen

The power units which vibrate the sash are of the same type and design as those used on Traylor vibrating conveyors which have been in use in conveying practice for a number of years. The vibrator is suspended so that all the vibration is absorbed within the unit and none is transmitted to the building supports. The power unit takes its energy from any standard alternating current and through the use of a small motor generator set furnished with the screen, the intensity of the vibration is under rheostat control.

The screen is furnished in four standard widths and in any length necessary to accomplish the necessary production. On single and double deck screens up to 6 feet in length one vibrator is used. On screens over 6 feet long and up to 12 feet in length two vibrators are used. On screens over 12 feet in length three or more vibrators are used to oscillate the screen sash. The steel sash of the screen, over which the screen cloth is tightly stretched, is vibrated as a unit. All cross ribs for the support of the screen cloth are equipped with specially moulded rubber strips which protect and prolong the life of the screen cloth. A complete renewal of cloth can be made without special tools in ten minutes.

The Ransome 27-E MASTER PAVER

MORE YARDS per Hour
MORE HOURS per Year
MORE YEARS per Life of Paver

Your present paver may be doing its best—but is its best *enough?*

The chances are that if it is *too* old it may be running—but—there's danger that it may lay down on the job just as you need it most.

Sooner or later the old paver will wear out. Possibly it is on its "last legs" now.

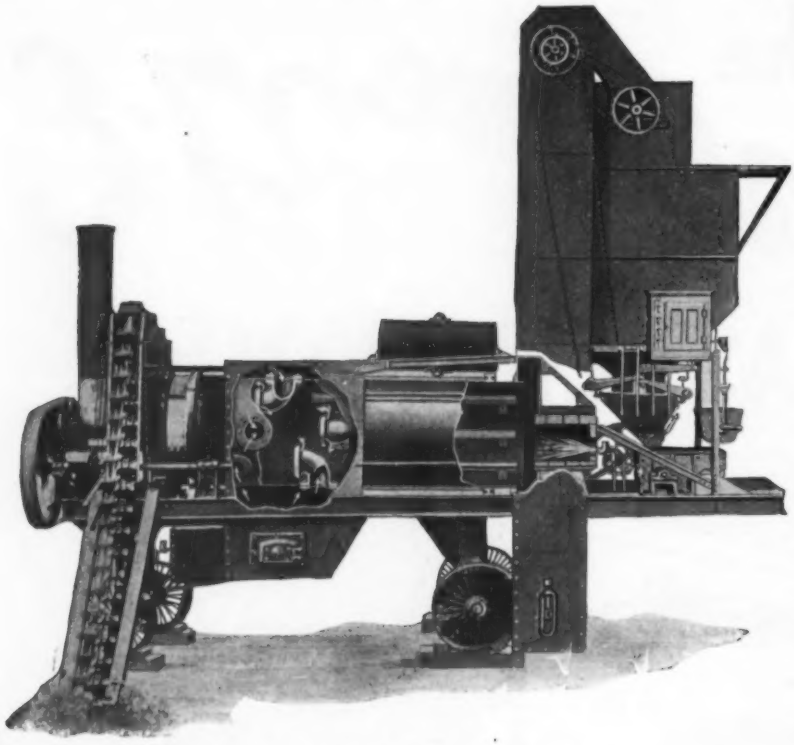
Don't delay—if there's danger of a breakdown with consequent loss on the job—then by all means investigate the merits of the Ransome 27-E Master Paver *now.*

The nearest Ransome distributor will be pleased to give you complete information or write for Bul-125.

Ransome Concrete Machinery Company

1850—Service for 81 Years—1931

Dunellen **New Jersey**



The New Cummer Two-Fire Asphalt Plant

A Two-Fire Dryer for Portable Road Asphalt Paving Plants

A TWO-FIRE dryer which is believed to be a long step forward in the design of direct-heat rotary dryers, has been announced by the F. D. Cummer & Son Co., Cleveland, Ohio. The principle employed in the application of the heat to the drying material embodies the advantages of both the internal fire and external fire types.

The dryer cylinder revolves on steel tires and rollers close to the front or feed end and at the discharge end, and it is driven by suitable gears. The front end of the cylinder except that part occupied by the front tire and supporting rollers is enclosed by a fire brick and asbestos-lined casing for about one-half of its length and this portion of the cylinder has inlet holes cut in the walls. These heat inlet openings are covered on the inside by hoods and allow the heat to enter, but prevent material from leaking out. The rear half of the cylinder is not enclosed, but is suitably insulated. The rear end of the cylinder is closed by a breeching to which an oil-burning combustion chamber is fitted.

The casing around the front half of the cylinder extends considerably below the cylinder and forms a coal-burning furnace. At the forward end of the coal-burning furance is fitted an oil-burning combustion chamber. Either coal or fuel oil can be burned, preferably oil.

This construction of the front end of the drying cylinder with the heat inlet openings and fire-brick lined casing is the same as has been used on Cummer dryers for many years and the combined advantage of large capacity, high evaporation and low dust loss because of the manner in which the heat is applied to the drying material. A fan is attached to the breeching in the front or feed end of the cylinder to supply induced draft to the furnace and to draw the heat through the inlet opening as well as to carry off the water vapor.

The wet sand and stone are fed through a feed spout in this breeching. As the wet material enters the drying cylinder, it is met by a blast of hot dry air from the first hood and as it travels toward the discharge end, it is met by fresh blasts of hot dry air from each succeeding hood. These hoods are placed at intervals of about 18 inches. Because the material entering the cylinder is wet and cold, the heated air from the first hood quickly becomes saturated with moisture and loses its heat and is drawn out by the fan. The heated air from the following hoods loses its heat more slowly and stays in the cylinder a correspondingly longer time, as the drying material works towards the discharge end, constantly becoming hotter and dryer.

The drying cylinder is designed so that the sand and stone will be warm and almost dry before it passes the last heat inlet and the material then passes rearward into the dry heat from the rear oil combustion chamber. By regulating the supply of oil to this combustion chamber, the dried material can be discharged at any temperature from 200 to 500 degrees Fahrenheit. The temperature of the sand and stone as it is discharged from the dryer is registered by a thermometer on the mixer platform in plain view of the mixer man and, as he is responsible for the temperature of the asphalt mixture, he also has control of the oil supply to the rear combustion chamber, so that he can at all times have the sand and stone discharged into the storage bin over the mixer at the proper temperature.

In most bituminous paving mixtures, the sand and stone are required to be dry and heated to about 350 degrees Fahrenheit. Some mixtures require a higher temperature or a considerably lower temperature but they all require the mineral aggregate to be dry because if it is not dry, the bitumen cannot even adhere to the surface of the particles of sand and stone, to say nothing of penetrating the interstices as it should.

A 25-Ton Gasoline Locomotive

A HEAVY-DUTY gasoline locomotive with a four-speed transmission and a multiplying gear which gives a high speed range and in which it is possible to shift gears on a grade, has been announced by the Mid-West Locomotive Works, Hamilton, Ohio. This locomotive with a rugged trans-

A Mid-West 25-Ton Locomotive

"The Faster the Time the Better the Times"

THE character of a community—the way its people live and do business—is influenced as much by the roads outside it as by the streets within it. Widen, straighten, or resurface a highway and immediately the road is used more. The whole community responds.

Farmers deliver better crops and better live-stock because they're in closer touch with markets. Shrinkage losses and haulage costs are cut. And better times come to all members of a community when fresh fruits and vegetables are plentiful in local markets.

Projected road improvements materialize faster once a community discovers Tarvia "Re-Tread"—and the economical answer it provides to any highway problem. Whether you must reclaim an old road, replace dirt or improve gravel, rebuild or widen any highway, Tarvia "Re-Tread" fits the job and fits the budget.

The Tarvia field man will gladly give you the details. 'Phone, wire or write our nearest office.

The Barrett Company

New York	Chicago	Philadelphia
St. Louis	Minneapolis	Boston
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THE BARRETT COMPANY, Ltd.
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Tarvia "RE-TREAD"

TRADE-MARK REG. U. S. PAT. OFF.

mission giving eight speeds in either direction has a powerful clutch running in oil and needing no adjustment.

This locomotive is powered with a Climax Blue Streak Model R-81 8-cylinder, valve-in-head engine with 6-inch bore and 7-inch stroke, developing 200 horsepower at 1,000 rpm. The drawbar pull ranges from 12,500 pounds in first speed to 1,950 pounds in eighth speed. The transmission is of the jaw clutch type with all gears made of heat-treated alloy steel with stub teeth and wide faces. The shafting is of heat-treated alloy steel of large diameter which, with the speed change gears and beveled reversing gears, run on Timken roller bearings.

The multiple disc clutch which is central spring-operated has friction discs of aluminum alloy plates with cork inserts providing a large friction area. The entire clutch is enclosed, with the friction discs running in oil to reduce heat and to give longer life.

The frame of this locomotive is a one-piece cast steel unit with coupler pockets and spring pockets cast in. The engine supports are cast integral with the frame, which is very heavy and is guaranteed against breakage. The engine is 20 feet 6 inches in length and 22 feet 6 inches with A.R.A. couplers. It is 9 feet 7 inches wide for 56½-inch gage and 8 feet wide for 36-inch gage. The overall height is 10 feet 6 inches. The locomotive is equipped with hand-operated sanders, the sand being carried behind the engine to keep it dry. The wheels are 33 inches in diameter, of rolled steel. It is equipped with straight air brakes and an auxiliary hand brake standard. The gravity feed fuel tank has a capacity of 75 gallons.

A New Portable Asphalt Patch Plant

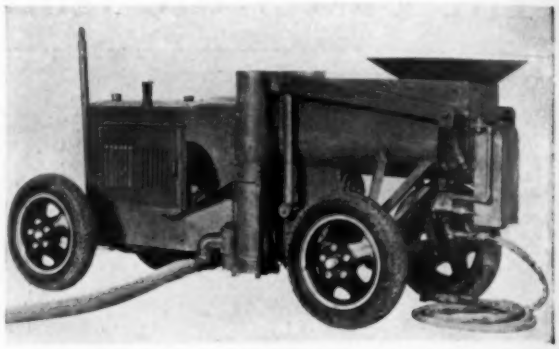
An Asphalt Patch Plant

A STRAIGHT line portable automatic asphalt patch plant on a rigid trailer frame with rubber-tired wheels and conforming to highway and street regulations has been developed by Hetherington & Berner, Inc., Indianapolis, Ind. The plant has ample capacity for any patch or maintenance job, and will mix black base or binder as well as topping material. It can also turn out cold mix material, if desired. Cold material fed into the feed hopper is not again touched until it is discharged as finished material from the mixer at the end of the plant.

There is one hot and one cold elevator, a dryer drum heated internally by fuel oil through a combustion chamber, a storage bin for aggregate material and a hot material bin fitted with partitions. The tool heater and asphalt kettle are heated by oil burners supplied with pressure by a built-in air compressor. The material can be screened to any desired size as a rotary screen is provided above the hot storage bin. A dust bin provides dust for the mix which is prepared in a rugged mixer of double-shaft pug mill type.

A 30-horsepower gasoline engine provides power for driving the machine through one main shaft from which all units are driven by means of cut gears and Diamond Roller chains, there being no bevel gears used in the machine. The plant is equipped throughout with SKF roller bearings.

Asphalt flows by gravity from the asphalt kettle to the weigh bucket located under the hot material bin and thence to the pug mill mixer beneath. The entire plant is enclosed in a housing of steel, and weighs approximately 15,000 pounds.

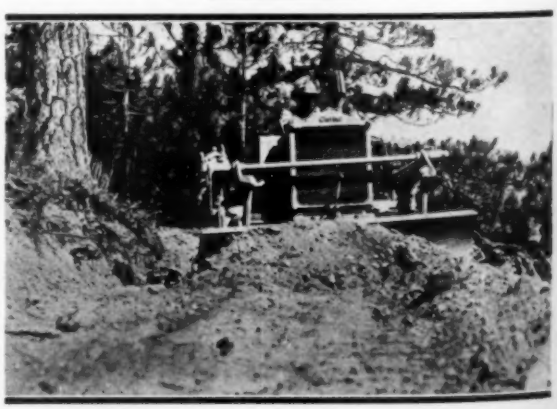


The Mud-Jack, a Combination Mixer and Pump

New Device Corrects Settlement Under Rigid Type Pavement

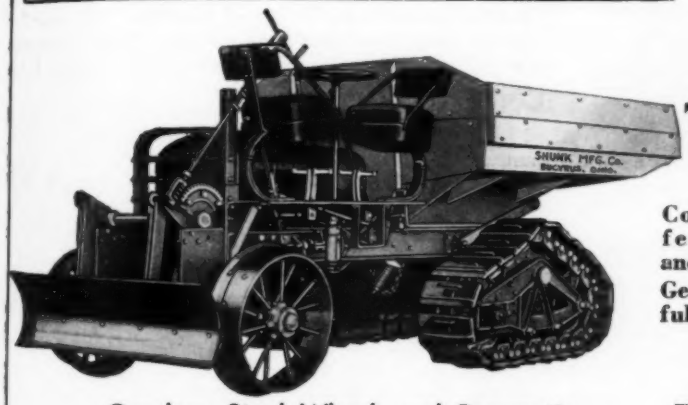
A NEW device for raising sunken pavements has been announced by the National Equipment Corp., N. 30th St. and W. Concordia Ave., Milwaukee, Wis. The maintenance of rigid types of pavements by the correction of settlement is a problem of hard-surfaced road construction which is demanding the increasing attention of highway and maintenance departments.

The N.E.C. Mud-Jack is a combination mixer and pump which corrects the pavement level by forcing the mixed mud through holes cut in the slab. Top soil and water are mixed with just enough cement to take up the shrinkage, usually about one bag of cement to a yard of dry materials. This mixture is pumped through holes drilled in the slab, the pressure in the pump being sufficient to force the mud under the slab, causing it to rise. Normally, about three holes are drilled for each 8 feet of 18-foot road slab. Pavements in which dips of from 1 inch to 18 inches in depth occur can be returned to their original grade easily. The pressure required to raise the slab is low. The use of this Mud-Jack makes possible the maintenance of pavements with a minimum delay to traffic and at costs well below the expense of adding a bituminous carpet by tearing out and replacing the pavement. Subsequent settlements due to continued readjustment of the grade may be picked up economically at a future time.



A Cletrac Owned by the Forestry Department of the Federal Government and Used to Build Trails Through Government Forest Reservations

The
HIGHEST DEVELOPMENT IN EARTH HAULING VEHICLES



Crawlers, Steel Wheels and Pneumatic Tires all interchangeable on the same axle

The
CAMEL
Gravity
TRACTOR DUMP WAGON

Combines in one heavy-duty unit features of Truck, Tractor, Trailer and Bulldozer.

Gear drive. Auxiliary rear axle carries full load.

Capacity	**4 Yards**
With Sideboards	**5 Yards**

Where haulage problems are difficult, the CAMEL SMASHES THROUGH, INCREASING CAPACITY OF POWER SHOVELS AND ELEVATING GRADERS.

DESIGNED AND BUILT BY

SHUNK MANUFACTURING COMPANY

100 Auto Avenue ***Established 1854*** **Bucyrus, Ohio**

BETTER THAN EVER

A SUPER OIL, TAR and ASPHALT DISTRIBUTOR

— *for* Etnyre Oregon Ill. *1931* —

That is what
STATE OFFICIALS, COUNTY OFFICIALS and CONTRACTORS
will find embodied in the 1931

"ETNYRE MODEL F"

Designed and built to maintain and produce the best kind of BITUMINOUS ROADS by applying the material in just the right amount at the proper temperature.

This is an actual photograph of an "ETNYRE MODEL F" applying 7/10 gallons per square yard, asphalt heated to 340 degrees F. with 18' spray bars on the Sanford-Orlando Road No. 3 in Florida. This is a splendid example of

"ETNYRE FULL WIDTH DISTRIBUTION"

The first application of 2 gallons per square yard was also applied with 18' spray bars.

Let us send you bulletin No. 503 giving specifications and more interesting facts.

Manufactured by

E. D. ETNYRE & COMPANY
Oregon, Illinois

SALES OFFICES IN PRINCIPAL CITIES

A Sterling Truck Equipped with an Alcoa Aluminum Body and Heil Hoist

Aluminum Bodies Permit Larger Loads

TRUCKS that haul building materials are generally loaded to the limit allowed by state highway departments. Hence, if the weight of the trucks can be decreased, the pay load can be increased. An interesting example is offered by the Manegold Stone Co., Milwaukee, Wis., which owns two Sterling Model DC26 trucks, made by the Sterling Motor Truck Co., Milwaukee, Wis. Each truck is equipped with an aluminum dump body and a Heil hoist made by The Heil Co., Milwaukee, Wis.

The bodies were made entirely of the light strong alloys of Alcoa aluminum, a product of the Aluminum Co. of America, Smithfield Building, Pittsburgh, Pa., in the form of sheet structural shapes and rivets. The total weight of each truck so equipped is 13,300 pounds as compared to 15,380 pounds when equipped with a steel body. The difference in weight permits carrying an additional ton without exceeding the gross load limitations permitted by highway regulations.

In this case the aluminum body permits hauling eight cubic yards of gravel as compared to seven with a steel body. In hauling crushed stone it carries nine cubic yards as compared to eight with a steel body. Loads of other materials are increased in like proportion, enabling the operator to cut hauling costs per yard or ton.

Each truck makes an average of twelve 8½-mile trips per day. With the increased capacity of 1 ton, the operator gains 12 tons per day per truck because of the lighter weight of the aluminum body. This increase in hauling capacity with no increase in operating cost allows the operator to write off the extra cost of the aluminum bodies in one year. From then on the extra 12 tons per day are hauled free.

Precision-Built 2 and 4-Cylinder L-Head Engines

GASOLINE engines representing the latest practice in modern engine construction, yet embodying nothing that is untried or unaccepted, are announced in the 2-cylinder, 3 to 6-horsepower and 4-cylinder 7 to 12-horsepower L-head engines of the LeRoi Co., Milwaukee, Wis. Precision machines and thorough inspection and testing bring about unusually close tolerances. The ball-bearing construction used in these engines permits of a much more compact unit without any sacrifice in accessibility, as well as a very considerable decrease in weight as compared with even 2-cylinder models of equal horsepower. All power units are enclosed in a heavy gage sheet steel housing which can be locked and which protects the engine from both dirt and weather.

The ball-bearing construction, together with the short stroke and lighter reciprocating parts of these engines, make possible speeds considerably higher than advisable in previous industrial engines.

The cylinder blocks are of high quality close-grained alloy iron which is electrically refined, providing absolute control over the quality and structure of the metal. These blocks are first rough-bored, then reamed to size and finally honed to insure perfect shape and a smooth finish allowing the piston rings to fit themselves at once without the destructive wearing in process encountered with ground cylinders. The cylinder heads are designed to allow large unrestricted water passages for adequate cooling and to permit a proper flow of gases both in and out of the combustion chamber.

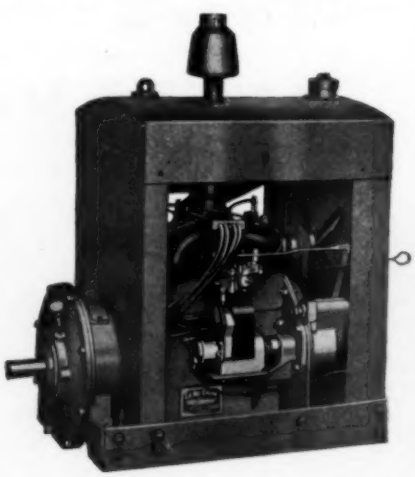
The crankshaft is drop-forged of a special heat-treated steel and each shaft is Brinnel tested to insure uniform hardness. The crankshaft is mounted on very large groove ball bearings which are supported in the crankcase in such a manner that as the engine warms up and the resulting elongation of the crankshaft occurs the bearings are allowed to move without disturbing the alignment of the shaft or the fit of the bearings.

The pistons are of close-grained grey iron, designed to provide maximum strength with minimum weight. They are drilled through the lower ring groove to allow any excess oil to drain back into the oil pan. The pistons are fitted with three rings, two compression and one oil control, constructed to give uniform wall pressure, which results in a positive seal between the combustion chamber and the crankcase. The piston pins are of a special chrome nickel steel, case-hardened, ground and lapped to give a smooth hard wearing surface. The connecting rods are drop-forged I-section of chrome nickel steel fitted with a generous size high quality babbitt bearing.

Oil is distributed to the various parts of the engine requiring lubrication by means of a combination pump and splash system. The pump is positively driven from a camshaft and is not dependent upon any spring whatsoever for its action. The engine is filled with oil through the breather opening on the accessory side of the crankshaft and this opening is protected from dirt by means of a brush which fits tightly into the breather tube. The oil gage is of the bayonet type and it located on the accessory side of the engine.

Cooling is accomplished by means of a large capacity radiator with considerably more cooling surface than generally used. Air is drawn through this radiator by means of a large ball-bearing fan driven by a V-type belt which requires practically no attention. Water is circulated by means of the thermo-siphon system.

The carburetor is of the automotive type, simple and completely sealed. The magneto is fully enclosed against dirt and moisture. It is of the high tension type which makes the engine easy to start. The governor is of LeRoi make especially designed for this engine. It is of the flyball type completely enclosed and equipped with automatically oiled ball bearings.



The LeRoi Model WP5 4-Cylinder Power Unit

Writing *their* Records *in the* Ground

More than twenty years' service shows that GOHI CORRUGATED CULVERTS are durable even beyond the usual needs of modern road drainage. They ordinarily outlast the roads under which they are laid. The reason is: the GOHI Genuine Open Hearth Iron — guaranteed 99.90% pure iron-copper alloy — from which they are fabricated.

Judge a Culvert by its Record *in the Ground*

GOHI Culverts have been demonstrating their durability and practical advantages for road drainage for almost a quarter of a century.

Many GOHI Culverts, installed in 1909, removed because of road relocations or changes in drainage conditions, were examined during the past year. In every instance, they were found to be practically perfect, notwithstanding the more than twenty years of warfare against the forces of soil, water, erosion, corrosion, freezing, and the vibration of traffic.

GOHI Culverts stand up under the most adverse conditions. In new fills which are settling or shifting, the natural flexibility of these culverts prevents them from being broken, crushed or pulled apart, as too frequently happens with rigid types.

It is such performance — in the ground — that justifies the installation of GOHI Culverts wherever low-cost drainage is desired. Write today to your nearest GOHI Fabricator for full information.

GOHI CULVERT MANUFACTURERS, Inc.
Newport, Kentucky

GOHI FABRICATORS

The Newport Culvert Co.
Newport, Ky.

The Pennsylvania Culvert Co.
Philadelphia, Pa.

Denver Steel & Iron Works Co.
Denver, Colo.

A. N. Eaton, Metal Products
Omaha, Nebr.

Feenaughty Machinery Co.
Portland, Oregon

Tennison Brothers
Texarkana, Ark.

Capital City Culvert Co.
Madison, Wis.

Central Culvert Co.
Ottumwa, Iowa

Roanoke Sales Corp.
Roanoke, Va.

St. Paul Corrugating Co.
St. Paul, Minn.

Tennison Brothers
Oklahoma City, Okla.

GENUINE OPEN HEARTH IRON
GOHI
TRADE MARK
PURE IRON - COPPER ALLOY
REG. U.S. PAT. OFF.

(Meet copper-bearing pure iron requirements in all accepted specifications for corrugated metal culverts).

GOHI
PRONOUNCED "GO-HIGH"
Corrugated
CULVERTS

A Jaeger Truck-Transit Mixer Mounted on a Federal Chassis

A Truck-Mounted Mixer with Delivery Chute

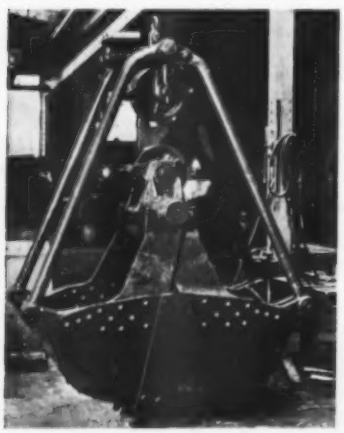
SPEED and economy which characterize modern construction work are reflected in the new 4 to 5-ton Federal chassis made by the Federal Motor Truck Co., Detroit, Mich., which is equipped with a Jaeger truck-transit mixer for road building or construction work. The mixer equipment is made by the Jaeger Machine Co., Columbus, Ohio. The truck has a 6-cylinder, 90-horsepower engine with seven-speed transmission, a full-floating worm drive, rear axle and four-wheel Westinghouse air brakes.

Concrete may be premixed or mixed-in-transit and the time can be extended to a period of two hours or the drums speeded up and the mixture completed in two minutes. The drum is discharged without tilting it, eliminating the weight of a hoist which would be necessary for this purpose. The automatic loading and mixing of material en route and the discharge of the finished product by the mixer all conserve time and labor.

A Clamshell Bucket with Roller Bearings

THE 1931 model of the Haiss Hi-Power bucket made by the George Haiss Mfg. Co., 142nd Street and Park Ave., New York, N. Y., has its sheaves equipped with Hyatt roller bearings which are protected by means of rings and grease seals. All sheaves, as well as other wearing parts, are equipped with Alemite lubrication.

The teeth of the Haiss bucket have been redesigned so as to give more effective digging ability which has been aided by changing the angle of the teeth with reference to the slope of the jaw. The jaws have also been increased in size and the brackets are of the cantilever type. The bottom sheave block has been redesigned and is now made entirely of steel. The sheaves are held by the upper bracket of this block so as to keep them out of the dirt and make it easier to reeve the cable. That part of the bracket directly under the sheaves is sloped toward the discharge, so that any dirt that may get in will fall out.



The 1931 Model Haiss Hi-Power Clamshell Bucket

The guide pulley alignment device consists of two sheaves with two side rollers which are case hardened to make for long wear. The connecting rods at the top of the head are so arranged that no shimmying can result after the bucket has been worn.

The ½ and ¾-yard buckets are furnished with five sheaves, two at the head and three at the bottom. On the 1-yard size and larger, three sheaves are furnished at the head and four at the bottom giving a closing ratio of 1 to 7.

A New Line of Industrial 6-Cylinder Gasoline Power Units

A NUMBER of new developments in industrial power units have been announced by the Waukesha Motor Co., Waukesha, Wis., in its new series of 6-cylinder portable power plants. These units are built in five sizes with two more to be added shortly, ranging in horsepower from 35 to 60 and speeds running from 1,600 to 2,000 for full load continuous service.

The New Waukesha 6-Cylinder Power Unit

All of the engines have Waukesha Ricardo heads with blue flame manifolds, built-in governors, full pressure oiling and water pump cooling. A feature of the unit is the simplicity and lightness of the housing, due to the extensive use of drawn and pressed steel parts. The radiator is built on a new principle with a seamless drawn pressed steel shell, supported by heavy stamped gusset pieces which are bolted to the front support of the unit. The tanks are likewise single pieces of drawn steel of heavy gage and without joints, the possibility of leaks thereby being reduced to a minimum.

Each engine is equipped with a muffler to comply with the usual city ordinances, an air cleaner of improved design and magneto ignition. The gasoline supply is carried in a tank beneath the roof of the unit or at the buyer's option a fuel tank will be supplied in place of the gasoline tank so that the fuel may be drawn from a drum or can placed in some convenient spot. These units can be supplied with or without the house and side panels and with a clutch type power take-off or a stub shaft for direct coupled drive. They are supported at each end by flat mounting feet and are held by four bolts. Electric starting is sometimes desired and can be installed. Special manifolds for heavier fuels or for natural or artificial gas are available and for certain services demanding momentary acceleration, a governor accelerator or speed booster can be supplied. The units are finished in battleship grey.

"IT'S A WONDER!"

Ask any contractor what kind of rock drill he uses. If it has power, speed and endurance—if it's a small air-consumer, easy to handle, smooth-running and trouble-free—it's sure to be a "WONDER!"

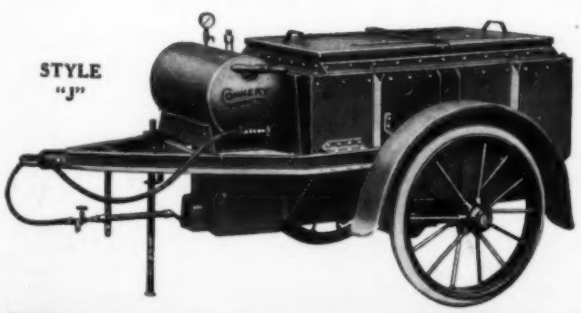
The *HARDSOCG Wonder Drill* has a *wonderful* record. You should see it perform! Let us tell you more about it. Write for information about *Wonder Drill No.* 9, specially adapted to contractors' and quarrymen's use, and *No.* 10, exactly like the No. 9 Drill, but considerably lighter.

We manufacture a complete line of Rock Drills (in nine different sizes to meet any requirements), also Paving Breakers, Clay Spades, Drill Steel, Air Hose and Pneumatic Sharpening and Shanking Machines.

HARDSOCG WONDER DRILL COMPANY
OTTUMWA, IOWA

CONNERY'S

Oil-Burning Tar and Asphalt Heaters



STYLE "J"

STYLE "J" oil-burning tar and asphalt heating kettle is designed for highway maintenance work and the roofing contractor. Of compact, improved modern design. It is sturdily made to withstand continuous and severe service. Burns kerosene, coal, oil or light furnace oil. Offered in five sizes: 60, 85, 110, 165 and 200 gallons capacities. Rubber-tired wheels (optional equipment)—steel wheels with rollerbearings, standard equipment.

Send for our little "Blue Book" illustrating our many specials in Tar and Asphalt Heaters, Oil-Burning Heaters, Oil Burners, Pouring Pots, Hand Spraying Attachments, Fire Wagons, Tool Heaters, etc.

CONNERY & CO., Inc.
4000 N. Second Street
PHILADELPHIA, PA.

A New Model Self-Feeding Bucket Loader

AN IMPROVED self-feeding bucket loader with helical ribbon-type feeders, has been announced by the Link-Belt Co., 910 South Michigan Ave., Chicago, Ill., through its Philadelphia department. The cast steel spiral feeder digs, lifts and conveys the material to the buckets, cutting a 7-foot, 7-inch wide swathe in the material handled.

The power plant of the 1931 Model Link-Belt grizzly crawler-loader is a simple, compact, 30-horsepower Buda gasoline engine equipped with a governor to automatically regulate the speed. If desired, it may be equipped with a 20-horsepower electric motor of standard specifications.

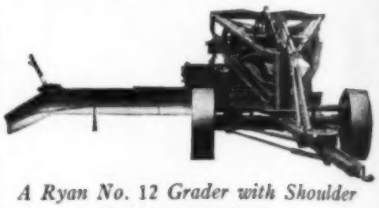
The elevator has a rated capacity of 1¾ yards per minute with uniform feed based on sand, stone and gravel 1½-inch and smaller. A 3-speed transmission gives the crawlers a speed of 30 feet per minute, or 66 feet per minute, in the digging direction, and 27 feet per minute in reverse. The driving machinery is housed in a dust-tight casing partly filled with oil, which assures lubrication of all parts.

The New Link-Belt Bucket Loader

The elevator boom is lowered from digging position without manual labor. The lower guides are released and the boom swings readily to a horizontal position. One man can restore the boom to digging position by pulling down the lower end of the boom and replacing the lower or holding down guides. Standard equipment for the loader includes an elevator chute of the swiveling type which operates through an angle of 180 degrees. It can be controlled from the operator's platform and has a renewable liner plate. The loader may also be equipped either with a measuring hopper or a vibrating screen. The standard measuring hopper has an adjustable bottom, permitting the measurement of batches of 7 to 28 cubic feet in capacity, varying by ½-cubic foot. It is equipped with an interlocking lever system for the strike-off, which prevents the opening of the discharge gate of the hopper until the batch is struck off, and also prevents the closing of the gate which permits delivery into the hopper, until the strike-off lever has been returned to the operating position. The clearance under the measuring hopper with the gate open is just 7 feet, which is ample for most trucks.

A Grader with a Versatile Blade

A MOTOR-controlled leanable-frame grader built to handle ordinary construction jobs more economically, has been announced by the Ryan Manufacturing Corp., 13501 Baltimore Ave., Chicago, Ill. This grader, which weighs 11,600 pounds and is built for use with tractors of 60 to 100 horsepower, can be used with the blade extended to either side for shoulder work which, with the combination of the leanable frame, leaning wheels and weight, prevents skewing under heavy loads. The blade on this heavy-duty No. 12 unit may be elevated far to the side for heavy bank work.



A Ryan No. 12 Grader with Shoulder Building Attachment

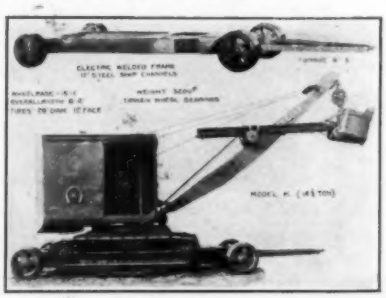
Through the use of the engine drive or motor control for the blade and leaning feature, the operator is relieved of the strain of operating hand wheels, as the moldboard may always be quickly adjusted to the correct position for greatest efficiency, merely by moving a lever. The leanable frame permits the weight of the machine to be balanced effectively against the load, holding the blade to its work.

This unit is made in three models: the No. 11 with 10 or 11-foot moldboard and the No. 12-C with 12-foot moldboard, for use with 40 to 60-hp tractors and the No. 12 unit with 12-foot moldboard, described above.

A Trailer for Handling Equipment Up to 14 Tons in Weight

A NEW 4-wheel trailer has been developed by Bay City Shovels, Inc., Bay City, Mich., primarily for the purpose of carrying 10-ton Bay City ⅜-yard tractor shovels as well as the 14½-ton Model K Bay City revolving shovels. The trailer is constructed with a sturdy electric-welded frame made up of 12-inch steel ship channels. The wheelbase is 15 feet 1 inch, and the overall width 8 feet, making it possible to use this trailer on all state highways without a special permit. The tires are 28 inches in diameter and have 12-inch faces. The heavy duty rubber-tired wheels are equipped with roller bearings.

Bay City shovels can be loaded on this trailer in 8 minutes time. It is a complete trailer, not an accessory to bolt to the machine, and may be used for handling any other shovels, cranes or contractors' equipment up to 14 tons in weight. While developed primarily to provide Bay City machine owners with a low-priced trailer for their equipment, the sale of it is not limited to Bay City owners.



The Bay City Trailer and a Shovel Being Carried on the Trailer

Carey Elastite

Expansion Joint

"arrived when promised"

YANT CONSTRUCTION COMPANY
GENERAL CONTRACTORS
Omaha National Bank Building
Telephone Atlantic 0990
OMAHA, NEB.

Nov. 20, 1930

Philip Carey Company,
Keeling Bldg.,
Omaha, Nebraska

Attention: Mr. Sutherland

Gentlemen:

We wish to take this opportunity of expressing our appreciation for the good service you gave us in connection with furnishing us with material for our Blondo Street paving job. The material arrived on the job on exactly the day you promised us it would be delivered to us. Considering the short time in which you had to make shipment of this material we feel that the service rendered in this particular case was unusual.

Yours very truly,
YANT CONSTRUCTION COMPANY
BY

HFW:B

Blondo Street, Omaha, Neb.

Road builders need quick service, and CAREY service is built to fill the need. CAREY Elastite Expansion Joint — the Felt Side Joint — so perfectly satisfied the need for concrete paving expansion joint that its use became nation-wide when it was introduced, nearly twenty years ago. Guided by this long experience, CAREY built a seasoned distribution organization — men who know the service road builders must have, and who deliver it.

That is why CAREY service is depended on, just as confidently as Elastite Expansion Joint itself; both have been proved by the only real test — performance. Now is a good time to order your spring requirements of CAREY Elastite Joint, thus insuring that the material will be on the job when the concrete is poured.

Write for 1931 price list and trade discounts.

THE PHILIP CAREY COMPANY x Lockland, Cincinnati, Ohio
Branches in Principal Cities

BUILT-UP ROOFS
ASPHALT PRODUCTS
ELASTITE EXPANSION JOINT
WATERPROOFINGS
ROOF PAINTS

Carey PRODUCTS

HEAT INSULATIONS
ASBESTOS MATERIALS
CAREYSTONE CORRUGATED SIDING
ASFALTSLATE SHINGLES
BUILDING PAPERS

A New Heavy-Duty Hydraulic Bottom-Dump Wagon

An 8-Yard Bottom-Dump Crawler Wagon

AN 8-yard crawler dump wagon on which no manual effort on the part of the tractor operator is required at the dump, as all door motions are operated hydraulically by means of a lever conveniently located at the driver's seat, is being manufactured by the Euclid Crane & Hoist Co., Road Machinery Division, Chardon Road, Cleveland, Ohio.

Hydraulic pressure is supplied by a simplified hydraulic pump attached to the rear of the tractor. This pump with few working parts assures proper pressures and eliminates excessive leakage.

The door lifting jack is located inside the tubular section of the wagon drawbar. This design affords protection for the jack and keeps out the dirt and dust. The end of the tubular section carries a removable cover plate. When this plate is off, the jack is easily pulled from the end of the drawbar for inspection or repair. The jack is held in place by a heavy cross shaft extending through the drawbar. The center of this cross shaft is drilled for lubrication purposes and is fitted with an Alemite unit at one end. This is the only place in the hydraulic mechanism of the wagon which requires lubrication.

These hydraulic bottom dump wagons are designed and built to operate either with the hydraulic pump or by hand, the hand winding mechanism being retained at the rear of the wagon. This eliminates any possibility of the wagon being out of commission if the hydraulic equipped tractor is tied up. Should the hydraulic lifting jack be removed from the wagon at any time, it is only necessary to clamp the door cables together over the front guide sheave to convert this from hydraulic to hand operation and use the hand winch at the rear.

The hoppers are made of extra heavy steel plates braced with steel angles and corner gussets. The doors are of extra heavy medium carbon steel plates and are reinforced with large angle sections. Each door is supported by four heavy steel hinges and is designed for maximum road clearance when dumping. The body is balanced on a pair of Euclid heavy duty ball-bearing Track Wheels by means of a 4-inch diameter heat-treated alloy steel main axle and two 3½-inch diameter stub axles of the same material. A single pair of doors swing under the through axle, allowing the material to be discharged quickly and evenly in uniform windrows, while round corners and sloped sides shed the dirt freely at the dump.

These hydraulic bottom-dump wagons are built in 5½, 6, 7 and 8-yard capacities. The 5½ and 7-yard wagons are built with a low side for elevating grader use, but can be converted into 6 and 8-yard capacities by merely adding top extensions to the low side and ends.

As a result of extensive tests, an improved crawler type track has been developed. The shoe is wider and stronger, has larger openings in the box section, interlocking surfaces designed to eliminate excessive wear, a thicker rail, specially hardened steel bushings which are easily removed and economically placed, harder and tougher shoe pins, carefully ground to give closer accuracy, straightness and longer life, and a much larger arch insuring still lighter draft than in the older models of this crawler wagon.

An 8-yard gravity rear end dump wagon has also been announced, built along the same general lines as the 6-yard wagon previously described in these pages. This gravity rear end dump is mounted on the improved Euclid 15-ton crawler Track Wheel assembly.

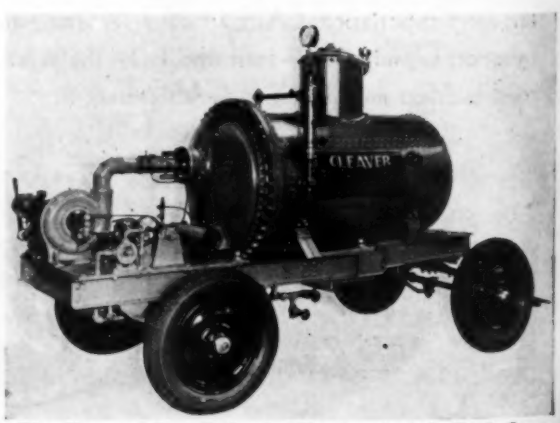
An Improved Heater for Asphalt Tank Cars

WITH the rapid replacing of steam by gasoline in most construction equipment the problem of heating asphalt tank cars has become greater. J. C. Cleaver Co., Inc., Oregon, Ill., has developed a compact, mobile tank car heater which is easy to handle and quick in operation.

The dimensions of the boiler are 36 x 60 inches from which would ordinarily be expected about 8 boiler-horsepower. This boiler develops 30 boiler-horsepower and generates full working pressure of 150 pounds in 10 minutes. The oil burner which is standard equipment is an integral part of the boiler and will burn all grades of oil from the heaviest fuel oil to natural gas, without changing its mechanism. The boiler is built without a stack, the low temperature gases being allowed to escape from the exhaust pipe at the front of the boiler after the fire has made six passes through the boiler. There is no part of the boiler or flues within it which is not covered by water.

The Cleaver tank car heater has sufficient capacity to heat three tank cars at one time and burns approximately 5 gallons of fuel per hour. This means that 30,000 gallons of material can be heated at high pressure for 10 hours with a fuel cost of about $3. The ordinary work of heating one and two tank cars at a time requires only a part of the boiler's capacity.

Both fuel and water supply tanks are built into the machine. There is ample oil and water capacity in these tanks for a 12-hour run requiring 150 pounds steam pressure. Standard equipment includes a 30-horsepower New Era steam boiler complete with all fittings to meet the A.S.M.E. code, an oil and gas burner, an air blower for the burner, a 3-horsepower Briggs & Stratton motor, high speed mounting of the boiler on 6-inch channel iron with the built-in fuel and water tanks totaling 100 gallons capacity, 2½-inch square axles, steel disc wheels and Firestone balloon tires. The unit has Timken bearings, high pressure Alemite lubrication, the Cleaver return condensate system and Crane valves and fittings throughout.



The Cleaver 6-Pass Boiler for Heating Asphalt Tank Cars

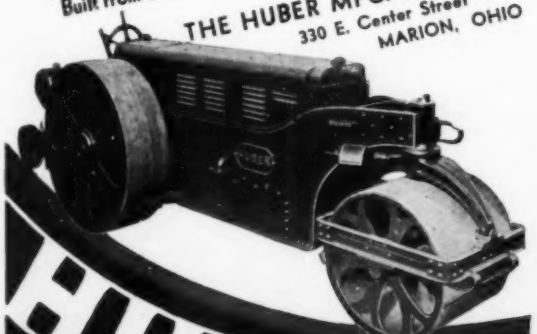
BALANCED

Huber Motor Roller at Work on Harding Highway

WEIGHT PLACED WHERE IT SHOULD BE " " " "

WEIGHT, to be most effective, must be properly placed. Huber builds the bulk of their roller's weight directly above or in the huge rear rolls. Thus it is available directly at the point of road contact. In this manner, Huber is able to guarantee more compression per lineal inch under the rear rolls than any other roller. Built from 5 to 14 tons. Write for New Huber Catalog.

THE HUBER MFG. COMPANY
330 E. Center Street
MARION, OHIO



HUBER MOTOR ROLLERS

Find out about this VALUE!

DON'T think of buying a mixer without finding out about this rugged profit-earner and the price that makes it the extraordinary record-making *value*. Write for bulletin.

KWIK-MIX

3½-S Mascot Mixer

BUILT for fast labor-saving performance and long trouble-free service. Charges and discharges on either side. So low that it saves a lot of shoveling and back bending. Short drum swing and big drum opening for fast, clean, 5-second discharge. No skimping in construction or capacity—a liberal 3½-S mixer with steel wheels or rubber cushion tires on roller bearing disc wheels and 2 h. p. hopper-cooled engine! Don't overlook this value. Write for specifications today.

National Equipment Corporation NEC

N. 30th St. & W. Concordia Ave., Milwaukee, Wis.

A-6229-½

A New ⅜-Yard Full-Revolving Shovel

A COMPACT, ⅜-yard shovel with a wide profitable service range for the contractor and which may be used as a clamshell, crane, dragline and backfiller, has been announced by the Buckeye Traction Ditcher Co., Findlay, Ohio, in its new Model O machine. The shovel is equipped with full-length crawler wheels, with electric cast steel treads, 15 inches wide. The wheel length is 8 feet 3 inches center to center of end shafts, giving a ground pressure of approximately 8½ pounds per square inch. A sturdy one-piece electric steel casting makes up the lower or traveling base. The upper or rotating base is another one-piece electric steel casting with rotating rollers of ample size. The rotating end and a traction shaft assembly is carried by Timken roller bearings.

The machine is powered with a four-cylinder, 4½ x 6¼-inch industrial type motor developing 50 horsepower at 1,200 rpm. The motor is mounted on the solid cast subbase as a complete assembly with the radiator, clutch and two-speed traction transmission on it. The shovel is steered easily, the traction units being driven independently. One may be driven while the other is held stationary, enabling the machine to turn completely within its own diameter.

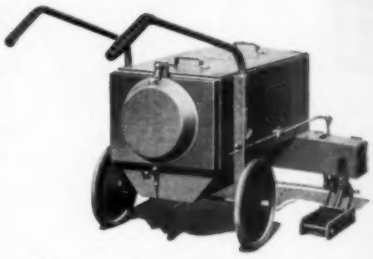
The New Buckeye Model D Shovel

The boom is of plate and angle construction, hot-riveted and rigidly reinforced against sidewise distortion. The web plates are electric welded in place. The dipper stick is of double hollow rectangular construction of heavy channels and plate welded the full length. The stick passes through the inside of the boom through swivel guides. The dipper is a one-piece manganese steel casting, chosen for strength and wearing qualities. The dipper is adjustable for three different cutting clearance angles.

The machine has two road speeds, approximately 1½ miles per hours in high and 1 mile in low. The low speed is advantageous in soft tractioning conditions and for climbing steep grades and inclines. The machine is 9 feet, 7 inches high without the boom and has a swinging radius of 7 feet, 4 inches from the center pin to the rear end. It is 7 feet 5 inches overall and 7 feet, 2 inches wide over the crawler wheels. The machine weight, complete with shovel equipment, is 30,000 pounds.

A Combination Joint Filler and Traffic Line Marker

A SMALL piece of equipment, moved by hand and equipped with two gasoline burners to insure the proper temperature of the material, are features of the No. 91 joint filler and traffic line marker made by Littleford Brothers, 485 East Pearl St., Cincinnati, Ohio.



The Littleford Combination Joint Filler and Line Marker

Hot tar or asphalt is placed in the small tank direct from an asphalt kettle. A gasoline burner under the tank makes up for heat lost by radiation, while the second burner heats the outlet valve so that it will not stick. A constricted tube delivers the hot asphalt direct to the joint at a temperature which enables it to penetrate to the bottom of the slot readily.

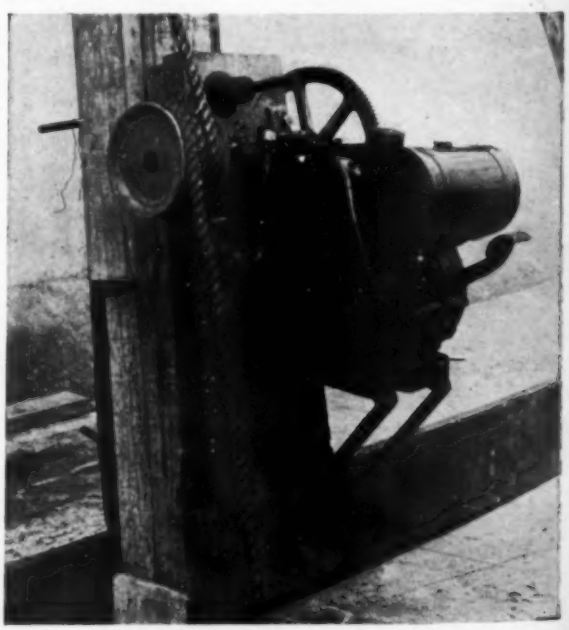
A marking attachment is another feature of this machine. When this attachment is in position, the joint filler can apply asphalt to the joint and, at the same time, make an asphaltic center line from 2 inches to 8 inches wide. This provides a truly permanent traffic line, which will not wear off.

A Small Portable Power Hoist

THE Wyman portable hoist, designed by Robert Wyman, Billerica, Mass., is powered with a 1-horsepower Briggs & Stratton gasoline engine, and weighs only 175 pounds. This hoist operates over a direct connected nigger-head with a lifting capacity of 500 pounds on a single line at a speed of 72 feet per minute.

This powered portable hoist is an inexpensive hoisting apparatus designed to meet the need for a powered unit where a larger unit would be uneconomical. It is particularly adaptable for the use of builders, water works and other municipal departments, public utilities and contractors. The mobility of the machine and the simplicity of its installation make it possible to shift it from one job to another and back and forth between jobs, giving the owner the greatest possible saving.

The exclusive sales rights for the Wyman portable hoist are controlled by Interstate Equipment Corp., 331-333 South Street, Newark, N. J., and distribution will be made through dealers in all parts of the country.



The Wyman Powered Portable Hoist

FOR EVERY CONDITION

HOT
COLD
WET
DRY

The Servicised Sponge Rubber Expansion Joint is the most perfect protection from severe water conditions and extreme heat. A non-oozing super-elastic joint material—impervious to water.

Type "B" Servicised Expansion Joints are of special quality asphalt and selected fibres—very low in moisture absorption—maximum elasticity and plasticity—minimum of oozing—long life and resistant to traffic wear.

Reinforced Servicised Expansion Joints were developed for requirements demanding rigidity and strength in fillers. The core of fiber is heavily saturated with high quality asphalt and reinforced on the sides by sheets of saturated felt—a quality joint for certain conditions.

Servicised Center-Core Expansion Joints of fibrated asphalt take up expansion and contraction and assure waterproofing by close adhesion to the pavement proper. The fiber center core reinforces and furnishes elasticity while the fibrated asphalt sides guarantee adhesion to the pavement slab.

Write us of your conditions and get our recommendations.

SERVICISED PREMOULDED PRODUCTS, INC.

GENERAL DISTRIBUTORS For Products Manufactured by

SERVICISED PRODUCTS CORPORATION

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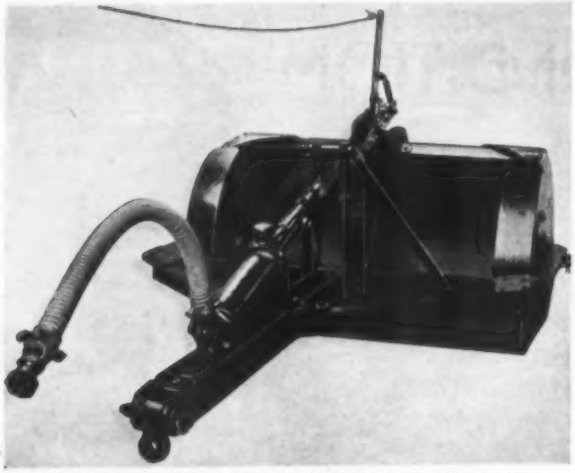


The New LaPlant-Choate 1¾-Yard Hydraulic Roll-Over Scraper

A New Hydraulic Roll-Over Scraper

A ROLL-OVER scraper with hydraulic control which gives the operator the ability to instantly control and vary the cutting depth by merely shifting a lever from his seat, has been announced by the LaPlant-Choate Mfg. Co., Inc., Cedar Rapids, Iowa. This variable adjustment and the use of a narrower, but deeper bowl, is said to make loading easier and permit hauling of larger capacities with the same power unit. It is also aimed to eliminate delays from the tractor stalling due to variation in soil while loading. It is possible to rotate the bowl backward, after loading, on its carrying runners to carry the load rather than to drag it. It also permits spreading in instantly variable depths. The load may be dumped in one pile or spread in any desired layers.

This 1¾-yard hydraulic-operated scraper is 5 feet wide, enabling it to work up close to the edge of a form and minimizing the side swing when obstructions are hit. Three 6-inch crucible steel runners are provided on the bottom of the pan which reduces the wear on the pan itself. These runners also protect the bowl of the scraper when it is in carrying position. The scraper is provided with a crucible cast steel cutting edge running the full width of the bowl and there are two small 6-inch cutting edges on each side to facilitate cutting through top soil. At the rear of the carrying surface an extra cutting edge is provided which is interchangeable with the front cutting edge.

The tongue is made of a 5-inch H-beam which is rigidly reinforced and braced to each side of the bowl to prevent chattering. The bowl is reinforced in the center by a large steel casting. The hitch is of the rigid type made to oscillate freely. Power is furnished to the small rugged jack by a simple rotary-gear pump which is easily mounted on the tractor power take-off. The tripping mechanism is built so that it is always in the clear when backing up, facilitating the use of the scraper in cutting out trenches and ditches.

Spiral Welded Pipe

AMONG the favorable features to be found in the new Armco spiral welded pipe, made by the American Rolling Mill Co., Middletown, Ohio, is the lighter weight, easier handling, long sections which reduce the number of field joints, smooth inside wall which reduces friction and pumping costs and the saving in shipping and handling costs.

At one of the process stages of the continuous sheet mill, great strips of metal as long as 200 feet and of 12-gage or heavier, come from the strip mill and are rapidly wound into coils. These are placed in a decoiling device on one end of the pipe machine which is one compact, self-contained production unit. The coil is unwound and flattened and then proceeds through the form rolls and is welded. The spiral seam is produced by feeding the strip into the machine at an angle of approximately 45 degrees. The great length of the coil of metal eliminates the necessity for frequently stopping the machine to add new stock and a cut-off mechanism synchronized with the speed of the welded pipe assures accurately gaged lengths. The spiral welded pipe is next taken to a testing machine where it is subjected to tests at twice the safe working pressure.

Armco spiral welded pipe is manufactured in jointless lengths up to 40 feet. Every joint is round, straight, smooth inside and light in weight. There are no interior grooves nor ridges to catch sediment or debris or to increase friction. Every ounce of metal is used to form the side walls and there are no projecting bands nor seams to add weight. It is easy to weld and can be used with any of the standard couplings. The pipe is supplied in sizes from 6 to 24 inches in diameter, in any wall thickness from 12 gage to ¼ or ⅝-inch. It can be furnished with any type of coating desired, mill coat, asphalt inside and out, or galvanized.

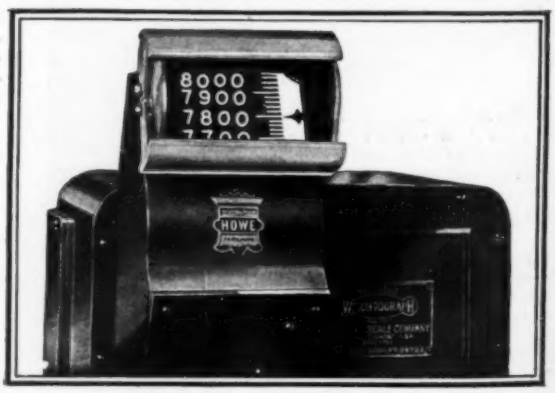
Beam Scales Converted to Automatic Registering Scales

AN attachment which may be used with any beam scale and known as the Howe Weightograph has been developed by The Howe Scale Co., Rutland, Vt. The operating principle of this device is based upon optical magnification instead of the other form of automatic weight indication which is based upon mechanical multiplication.

The Howe Weightograph is attachable to any built-in type of beam scale from 1,000 pounds upward. Dial scales are also convertible to Weightograph operation by merely removing the dial head, the remainder of the scale being retained.

Since this device is a self-contained unit, it is attachable to any make of beam scale from the light dormant to the huge railroad scale or to any scale convertible to beam operation. Without disturbing or replacing the scale, the Weightograph is attached to the free end of the weighbeam in place of the beam stand, providing positive automatic weight indication. The illuminated figures can be read easily in the dark. It has but one moving unit and that is mounted on ball bearings. A single moving unit is the only one necessary, as the scale employs optical magnification instead of mechanical magnification. There are no racks or pinions, gears, friction discs, compensating cams, or weighing springs.

The device should be useful in batcher plants and on platform scales at hot-mix asphalt plants.



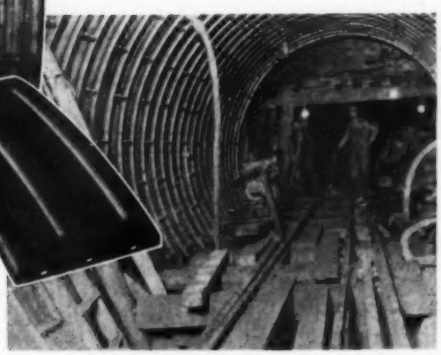
The Howe Weightograph

TRUSCON STEEL LINER PLATES
for Tunnels and Caissons

Construction of tunnels, subways, caissons and other underground work is speeded, simplified and safeguarded through the use of Truscon Steel Liner Plates. Many well-known, successful jobs testify to the practicability and economy of this method.

Truscon Steel Liner Plates are formed of individual segments curved to any desired radius, so that when assembled by bolting, a section of the tunnel or caisson is produced. The special design of the plates develops maximum strength and assures absolute uniformity.

Two standard sizes are manufactured; the radius, gage of steel and depth of flange depending upon individual requirements. Holes in the flanges are spaced accurately to insure easy and rapid erection.



Truscon Steel Liner Plates in use. Note the spacious shaft due to the complete absence of shoring.

Caulking or gaskets are readily applied when air pressure is to be used in caisson work.

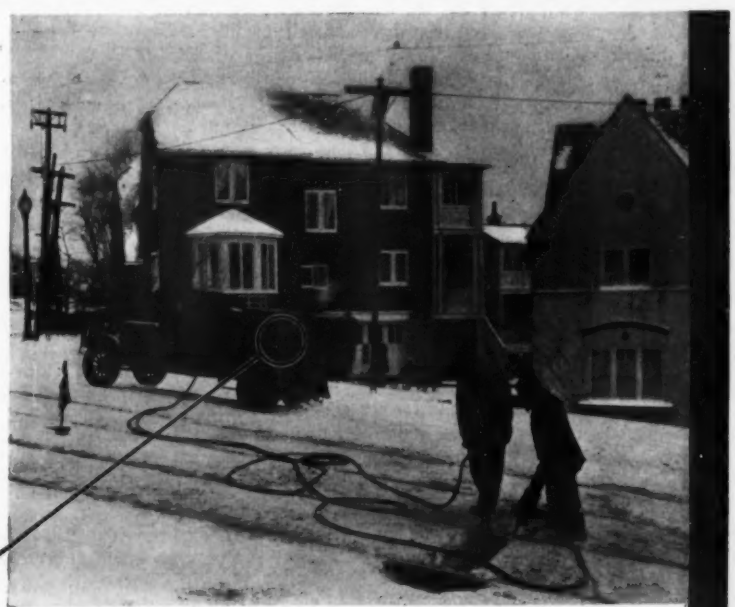
No complicated assembly is involved and no special tools are necessary. Shoring is eliminated and a considerable reduction in the excavating is made because of the narrow, rigid steel shell.

Suggestions, catalog and prices furnished without obligation

TRUSCON STEEL COMPANY
PRESSED STEEL DIVISION
CLEVELAND, OHIO

. . . and it was *FREEZING COLD*

But why waste valuable hours starting the compressor just because it is cold. With a "SCHRAMM" on the job, it's an easy task to crank the engine ONLY, let it warm up for a few minutes and then throw on the full compressor load—all set for a big day's work. "SCHRAMM" HAS A CLUTCH.



Here is the distinctive "SCHRAMM" clutch. It permits starting engine without compressor load.

A No. 120 truck-mounted SCHRAMM compressor operating two paving breakers for the Montreal Tramways Co. at Westmount, a suburb of Montreal . . . and it was cold.

There are other features—ask for the catalog.

SCHRAMM, INC.
West Chester, Pa.
Stocks and Service in All Principal Cities

The New Goroco Sand and Stone Spreader

A New Mechanical Spreader for Sand or Stone

CONTRACTORS are rapidly appreciating the value of a spreading unit for attaching to trucks to distribute sand or crushed stone over oiled or waterbound surfaces and are taking advantage of this type of equipment on contract work. The Goroco Mechanical Spreader Co., Upper Darby Post Office, Philadelphia, Pa., has made several improvements in its machine. Retaining the principle of centrifugal spread, the machine is now furnished with an 8½-foot wide hopper designed to accommodate the full tailgate opening on the propelling truck, eliminating the need for alteration of the tailgate as previously required.

The machine is attached to the truck by manganese steel clamps which grip the cross rod between the spring shackles. These clamps are weighted to make them self-operating. The spreader runs on a pair of cleated or rubber-tired wheels, the latter being generally preferred. The frame of the spreader is arc-welded throughout and the spreader disk is operated through an enclosed gear with Timken roller bearings in a steel housing. The adjustment to tighten the bearings is through a nut on the outside. The new spreader also uses angle construction instead of rods for the underframe carrying the spreader disk.

The quantity of material spread per square yard is regulated by a multiple slide gate operating in the hopper and controlled by a lever within easy reach of the operator. This opening is composed of two plates on top and two below, like a camera, cut square and so arranged as to be self-centering over the spreading disk, assuring uniform distribution at all times.

The new design retains the former advantages in that it is a separate spreading unit attachable to any make of truck and spreads any loose aggregate from dust to 1¼-inch sizes, requiring but two men for operation and has a capacity of 400 tons per day.

Maintenance of Concrete Pavements with Bituminous Materials

THE maintenance of concrete pavements varies from the simple filling of cracks to the entire resurfacing of the pavement. The most destructive agents are continuous expansion and contraction which have not been provided for by the installation of expansion joints, frost and impact from heavy motor trucks.

Several products have been developed by the Barrett Co., 40 Rector St., New York, for this work. Tarvia-XC is specially prepared for filling the narrower cracks. Such cracks should be filled as soon as possible after they appear. Each crack should be carefully cleaned out. An iron hook is handy to dig out the dirt that accumulates and this should be followed by a thorough sweeping. The material is then heated and poured into the crack until it slightly overflows the edges, the overflow being left to protect the edges from wear. The bituminous material should then be covered immediately with clean sand or similar covering material.

A new material known as Plastic Tarvia-XC has been developed for filling the wider cracks and joints in concrete pavements. It is shipped in 30-gallon steel drums. A special distributor fits on the head of the drum and the material is applied to the road under pressure through a hose and nozzle. A hand-operated gear pump produces the pressure and no heating is necessary to permit the material to flow readily.

Cracks and joints should be cleaned and prepared for filling as described above. The bituminous material is then applied to the crack or joint through the nozzle and the excess material struck off with the edge of a shovel. It should be covered with sand, road sweepings or similar cover material to prevent picking up by traffic.

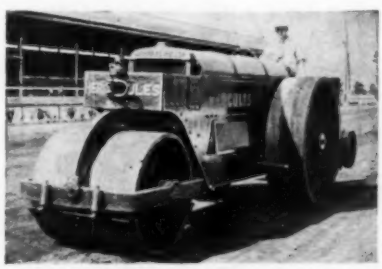
Plastic Tarvia-XC is truly elastic and will keep the crack completely waterproofed and sealed when the concrete expands or contracts due to temperature or moisture changes. It will adhere to the concrete and is reported to retain its plasticity indefinitely.

An Easy Steering Motor Roller

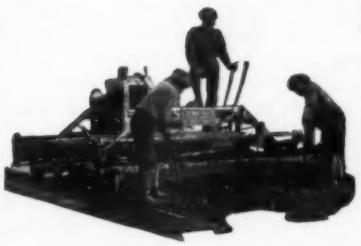
FIVE models of motor road rollers in sizes from 6 to 15 tons with a number of special features are offered by the Hercules Co., Marion, Ohio. These rollers are equipped with 6-cylinder engines and three forward and three backward speeds. A foot pedal on the operator's platform work the differential lock which engages the two rear wheels. There is only one operating level on the machine which greatly simplifies its operation.

Steering of even the heaviest rollers is made easy by two tapered roller bearings on the king post, two on the worm shaft and two on the steering shaft. The steel head casting the full width of the frame is riveted to the side plates and stiffener angles are carried all the way to the rear of the machine.

The smoothness of operation of these rollers adapts them for asphalt, bituminous macadam, rock asphalt, surface-treated macadam, asphaltic concrete and other types of work, including airports, compacting fills, and rolling railroad grades.



A Hercules 3-Wheel Roller



Any of 4 FINISHING COMBINATIONS in ANY LAKEWOOD Type "C" FINISHER

Every Lakewood Type "C," whether new or now operating, offers choice of any combination, equips you for maximum service. For fast, steady production on concrete and bituminous pavements, city streets and highways, use a Lakewood. Send for Catalog. CE

Also Subgraders, Grade Rooters, Road Forms (with or without Duo Rail attachment), Batch Boxes, Straight Edges, Hand Belts, Subgrade Testers.

THE LAKEWOOD ENGINEERING CO.
231 Dublin Ave., Columbus, Ohio, U. S. A.

LOADING DUMPING

SPREADING LEVELING

One-Man Automatic Tractor Scraper

Nearly ten thousand in use the world over, developing roads, streets, grading parks, golf courses and airplane landing fields and in fact doing anything that is possible with a scraper of this type.

It will pay you to investigate this outstanding tractor scraper. Do it today!

Four sizes: scraper width, 4, 5, 6, 7 feet.

Write for our circulars

The Gustav Schaefer Company
4180 LORAIN AVENUE CLEVELAND, OHIO

MORITZ SHOULDER AND BERM MACHINE

NEWER - BIGGER - BETTER
SPEEDS UP PRODUCTION - CUTS COSTS
- ENGINEERS LIKE IT - CONTRACTORS NEED IT -
USED IN MORE THAN TWENTY STATES
MORITZ-BENNETT CORPORATION
EFFINGHAM, ILLINOIS

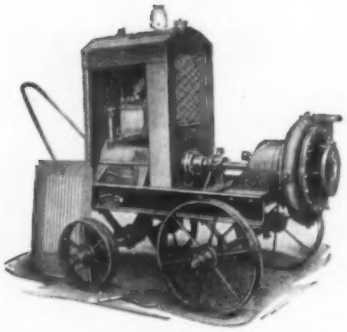
HVASS
HVASS

BITUMINOUS DISTRIBUTORS
HEAVY DUTY TRAILERS
SAND SPREADERS
CHIP SPREADERS
SWEEPERS
SPRINKLERS
HEATING KETTLES

Manufactured by

CHAS. HVASS & CO. Inc.
508 East 19th St. New York, N. Y.

HVASS BITUMINOUS DISTRIBUTOR



A Contractors' Portable Vortex Pump

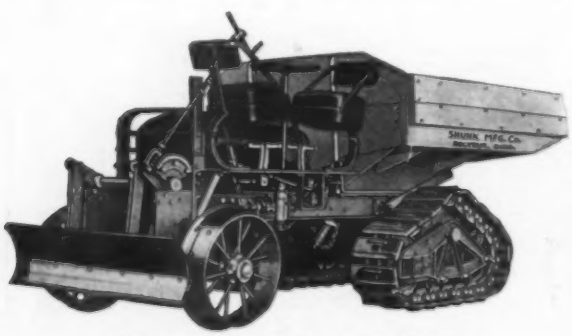
Gas-Engine-Driven Centrifugal Pumping Units

A LINE of direct-connected gasoline-engine pumping outfits which are simple in design, rugged in construction and which are said to require little attention, are being made by the Lawrence Pump & Engine Co., P. O. Box 70, Lawrence, Mass. These portable pumps mounted on steel wheels or solid rubber-tired wheels, deliver a steady flow of water and operate with no vibration as the pumps are of the centrifugal type. There are no valves or diaphragms and the pump handles muddy water or water containing a moderate amount of sand and gravel satisfactorily. These pumps are used for unwatering excavations, foundations, pier footings, well points, cofferdams, quarries, sewers and in road building.

The pump is directly connected by couplings to the gasoline power unit with no gear reductions, chain and sprocket drives or gear drives. The pump is of the single side-suction, open impeller type and is delivered complete ready for pipe connection. The engines are throttle-governed and equipped with a high tension magneto. They are radiator-cooled with a fan and automatic fan-belt tightener. The three smaller units with 3-inch and 4-inch suctions and two-cylinder engines are regularly supplied with rigid couplings between the engine and pump, but can be supplied with a clutch coupling if preferred, at slight additional cost. The outfits with 4-cylinder engines are furnished with clutch couplings between the engine and the pump.

A Flexible Tractor-Powered Dump Wagon

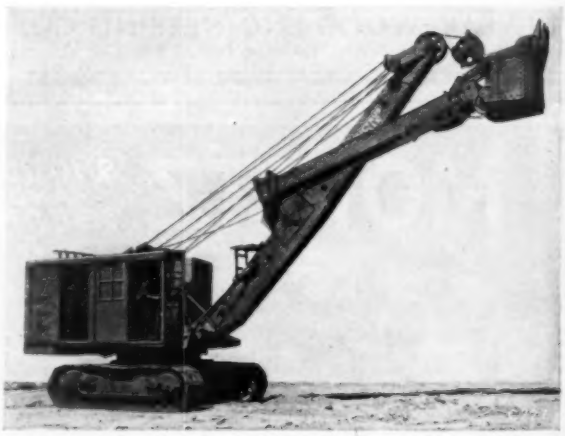
AN automatic dump wagon that can travel where trucks cannot go, which has 4 to 5 cubic yards capacity and is easily handled in a limited space, is being built by the Shunk Mfg. Co., Bucyrus, Ohio. This new Camel automatic gravity tractor dump combines in one heavy-duty unit many of the profit-earning features of trucks, tractors, trailers and bulldozers. The Camel is especially adapted to use in earth-moving operations such as in road construction, dams, levees and grading where all excavating and loading is done with power shovels or elevating graders. The machine is of heavy-duty construction throughout. The forward end of the tractor is supported by a heavy forged steel yoke 7 x ¼-inch securely bolted to the frame. The rear axles are bolted to the frame supported by an extra heavy electric steel casting, machined to close limits. Another feature of its design is the auxiliary axle of high carbon steel fitted with Timken bearings which carry the full load of the tractor, frame and payload, thus relieving the driving axle of all straining from load carrying and allowing the full power of the tractor to be realized in moving the vehicle.



The Camel Automatic Dump Wagon

Other features of the Shunk Camel are the heavy radiator guard which affords protection against damage from collision, a 17-gallon gasoline tank, the mounting of the motor transmission and differential on one continuous cast iron bedplate, both hand and foot operated brakes, a driving axle with enclosed gears running in oil, a hydraulic governor for the return of the body from dumping position and the body lock and trip for both the load carrying and dumping positions operated by a foot lever at the driver's seat.

The heavy duty Ross automotive type steering gear is geared 20 x 1. The flexible front axle has an oscillating movement of 14 inches, up or down on each wheel, the wheels remaining vertical throughout the entire movement of the oscillation. Even in soft earth the steering of this unit is made with ease. There is no side slipping, as the mud rings on the frotn wheels guard against this.



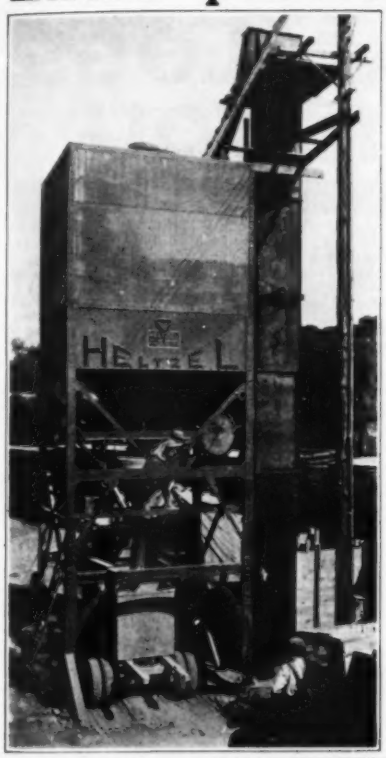
The New Bucyrus-Erie 43-B with Shovel Equipment

A New Addition to Line of Shovel Units

A NEW 1½-1¾-yard shovel-dragline-crane-clamshell, known as the 43-B, was recently announced by the Bucyrus-Erie Co., South Milwaukee, Wis., in order to meet the need for a machine to give increased yardage production at lower unit costs. This new machine is offered with a choice of diesel, gasoline or electric power, rope or chain crowd on the shovel, regular or special extra long and wide mountings for soft ground dragline work.

Among the features of this unit are hoist clutches power set, all operating levers toggle jn, smooth operating, oversize brakes with cooling fins, steering from the operator's platform with cab in any position, double-operating chocking brakes on crawler mountings controlled from the operator's seat, a service brake for operation on grades, inserted tooth dipper, power dipper trip, self-starter for the engine and a self-locking power boom hoist.

Extra profits with bulk cement if you weigh the Heltzel way



In the summer of 1930, one contractor saved $4,541.37 on a 6.67 mile paving job for the Pennsylvania Highway Department. This wise contractor used bulk cement—and assured himself of the saving by using a Heltzel Portable Cement Plant.

In batching bulk cement, it is important that the operator back-check every batch, to be sure of clean discharge from the batch hopper. The Heltzel method of weighing permits the operator to do this by merely glancing at the scale dial, and without balancing any scale beams or setting any poises.

This is one of the important reasons why Heltzel has developed the only really practical bulk cement plant. Write for others.

The **HELTZEL**

STEEL FORM & IRON COMPANY

WARREN, OHIO

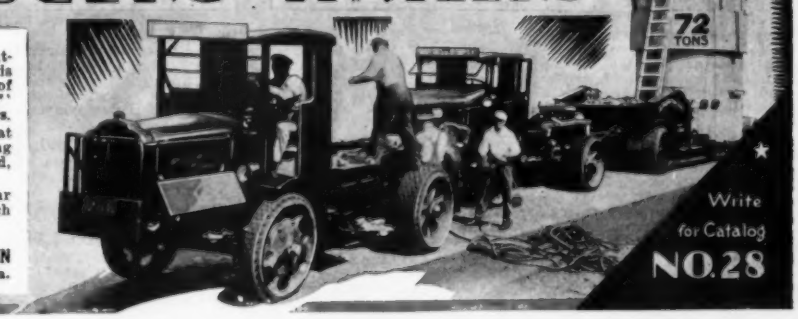
9 OUT OF 10 *are* **ROGERS TRAILERS**

SIGNIFICANT of outstanding leadership is the fact that nine out of ten of all low deck or "carry all" Trailers in use are Rogers Trailers.

Equally magnificant is the fact that a majority of the exceptional moving jobs, one of which is here illustrated, are handled with Rogers Trailers.

There is a standard unit for your job unless it is very unusual, in which case we'll build one to suit.

ROGERS BROTHERS CORPORATION
108 Orchard Street Albion, Penna.



Write for Catalog NO. 28

—OHIO—

TRACTOR DUMP WAGONS

Capacity 3 to 4 Yards

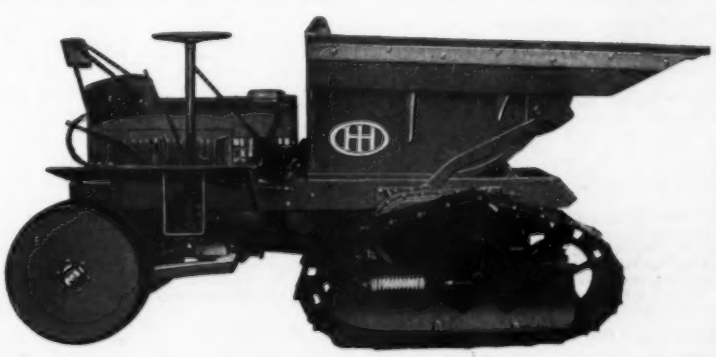
CRAWLERS — WHEELS — RUBBER TIRES

Interchangeable in the field

Manufactured by

THE OHIO LOCOMOTIVE CRANE COMPANY

BUCYRUS, OHIO



These especially selected catalogs and pamphlets of value to contractors are for free distribution. You will find it worth while to check these lists each month and write for the catalogs you need.

THESE CATALOGS ARE FOR YOU

Correcting Settlement Under Pavements

The N.E.C. Mud-Jack, a combination mixer and pump which corrects the pavement level by forcing the mixed mud through holes cut in the slab to raise sunken portions of rigid type pavements, has recently been announced by the National Equipment Corp., N. 30th St. and W. Concordia Ave., Milwaukee, Wis., who will send complete information upon request.

Gas-Engine-Driven Centrifugal Pumps

A line of direct-connected gasoline-engine pumping outfits which are simple in design, rugged in construction and which are said to require little attention, are being made by the Lawrence Pump & Engine Co., P. O. Box 70, Lawrence, Mass., and are described in Bulletins D-20, D-21, D-25, D-26, D-27, D-28, D-30, D-31, D-35 and D-40.

Filling Cracks in Concrete Pavements

Complete information regarding the maintenance of concrete pavements through the use of Tarvia-XC and Plastic Tarvia-XC, as well as the maintenance of other types of roads with Tarvia products, is contained in Form 402, an interesting 52-page booklet issued by the Barrett Co., 40 Rector St., New York.

More Workable Concrete

The use of Colloy, an admixture for concrete to increase its quality and workability, is described completely in Form 201-C which will be sent upon request by Colloy Products Co., Chouteau Trust Bldg., St. Louis, Mo.

Aluminum Bodies Permit Larger Loads

The Aluminum Co. of America, Smithfield Bldg., Pittsburgh, Pa., will be pleased to send to contractors a copy of its loose-leaf folder, describing and illustrating trucks equipped with bodies made of Alcoa aluminum which, because of their lighter weight, permit carrying heavier loads without exceeding the limits allowed by state highway departments.

A 6-Ply Paper for Curing Concrete

The Sisalkraft Co., 205 West Wacker Drive, Chicago, Ill., will be pleased to send a copy of its folder "Concrete Curing" which tells the difference between the setting and curing of concrete and explains the advantages of Sisalkraft waterproofed reinforced paper as an economical means of curing concrete walks and roads.

Three-Compartment Bins

Bulletin No. 200 describing Butler Type X bins which are three-compartment portable batching plants designed for jobs requiring sand and two sizes of coarse aggregates for each batch of concrete, and especially arranged for a weighing batcher, may be secured by those interested from the Butler Bin Co., Waukesha, Wis.

Industrial 6-Cylinder Gasoline Engines

A number of new developments in industrial power units have been announced by the Waukesha Motor Co., Waukesha, Wis., in its new series of 6-cylinder portable power plants which are built in 5 sizes ranging in horsepower from 35 to 60 and speeds from 1,600 to 2,000 for full-load, continuous service. These engines are described in literature which is available to contractors on request.

Trimming Shoulders and Cutting Costs

The Moritz shoulder finishing machine, which cuts labor costs, speeds up work, maintains the shoulders in good condition until accepted, eliminates the handling of excess dirt and utilizes available power on the job, is described in literature which may be secured from the manufacturers, Moritz-Bennett Corp., Effingham, Ill.

Wheelbarrows and Carts

The complete line of Sterling wheelbarrows for every purpose and Sterling concrete carts is described in literature which the Sterling Wheelbarrow Co., Milwaukee, Wis., will be glad to send on request.

Power Road Maintainers

The Burch power maintainer which is designed for use on maintenance work, such as cleaning out gutters, rounding and smoothing up streets to proper shape and keeping a uniformity of grade, removing snow from sidewalks and streets and many other similar purposes, is described in a folder which will be sent on request by the Burch Corp., Crestline, Ohio.

A New Hydraulic Bulldozer

A hydraulic bulldozer built specially for use in combination with Bates crawler-type road tractors and in which the operating mechanism is located below the level of the seat, giving clear vision to the operator, has been announced by Foote Bros. Gear & Machine Co., 111 N. Canal St., Chicago, Ill., from whom complete information may be secured.

An 8-Yard Bottom-Dump Crawler Wagon

An 8-yard crawler dump wagon on which no manual effort on the part of the tractor operator is required at the dump, is being made by the Road Machinery Div., Euclid Crane & Hoist Co., Chardon Road, Cleveland, Ohio, who will send data regarding it on request.

An Aluminum Straight-Edge

Literature describing the Lakewood straight-edge which is made of aluminum, weighs only 4½ pounds, is 10 feet long with a 1¼-inch diameter rolled bottom edge and a hemmed top edge, has a 10-foot handle which may be extended to 12 feet, and other interesting features, may be secured by those interested from the Lakewood Engineering Co., 520 Dublin Ave., Columbus, Ohio.

A Flexible Tractor-Powered Dump Wagon

An illustrated folder describing an automatic dump wagon that can travel where trucks cannot go and which has 4 to 5 cubic yards capacity and handles easily in a limited space, may be secured on request from the Shunk Mfg. Co., Bucyrus, Ohio.

Clamshell Buckets

Hayward Class E clamshell buckets of the power wheel type which provides a nearly permanent bucket structure and relieves the closing rope of excessive wear are described in Bulletin 650 which the Hayward Co., 32-36 Dey St., New York City, will be glad to send on request.

A Concrete Accelerator and Hardener

Acqua-Pruf, Inc., 393 Seventh Ave., New York City, will be glad to send to those interested complete information in regard to Acqua-Pruf, a liquid compound having an affinity for portland cement, which when added to cement, makes it possible for pavements to be opened to traffic in 24 hours.

Blocks for Manila or Wire Rope

Catalog C. E., describing Anvil brand blocks for manila or wire rope, which offer strength, service and safety, may be secured by those interested from the Western Block Co., Lockport, N. Y.

Wire Rope for Every Construction Need

Complete information in regard to American Steel & Wire Co. wire rope, among the features of which are the ability to stand up under gruelling tests, reduction in replacement costs, and dependability, may be secured by those interested by writing direct to the American Steel & Wire Co., 208 South La Salle St., Chicago, Ill.

A Double-Drum Electric Hoist

Street Bros. Machine Works, Inc., Chattanooga, Tenn., will be very glad to send to those interested complete information in regard to Street double-drum electric hoists for use in construction projects.

Rollers for Road Work

An illustrated booklet describing the complete line of Buffalo-Springfield road rollers, in a wide range of sizes, steam and motor driven, in three-wheel or tandem types, will be sent on request by the Buffalo-Springfield Roller Co., Springfield, Ohio.

Asphalt for Paving and Resurfacing

Standard Oil Co. of Indiana, 910 South Michigan Ave., Chicago, Ill., will be glad to send to interested contractors and engineers a complete description of Stanolind cut-back and paving asphalt for paving new roads and streets and resurfacing old ones.

All-Steel Hand Hoists

Beebe Bros. all-steel hand hoists, which have a straight-line capacity of 5 tons, weigh 110 pounds and have two speeds, 4 to 1 and 24 to 1, are described in literature which Beebe Bros., 3219 First Ave., So., Seattle, Wash., will be very glad to send on request.

Sure-Footed Traction

Complete information in regard to Moon tracks for tractors which offer four-point ground contact, provide traction and full drawbar pull at the same time, and insure smooth traveling will be sent on request by the Moon Track Co., Dept. C. E., 1822 McCormick Bldg., Chicago, Ill.

Cast Iron Pipe

Complete information in regard to Universal cast iron pipe may be secured by those interested by writing to the Central Foundry Co., 420 Lexington Ave., New York City or to any of the branch offices located at 332 So. Michigan Ave., Chicago, Ill.; Praetorian Bldg., Dallas, Texas; Comer Bldg., Birmingham, Ala.; and 100 Potrero Ave., San Francisco, Calif.

Gloves for Construction Work

You can't handle construction jobs with kid gloves. You need sturdy, long-wearing gloves which offer real protection. Gloves of this type are described in a folder which may be secured from the Sabin Co., 536-40 West Federal Street, Youngstown, Ohio.

Power Drag Scrapers

Sauerman Bros., 464 South Clinton St., Chicago, Ill., will be glad to send on request copies of its new 72-page catalog "Power Drag Scrapers" which describes and illustrates Sauerman power drag scraper equipment as well as containing much valuable information in regard to the application of this equipment to earth handling problems.

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CHIMNEYS

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OLD CHIMNEYS

Inspected and repaired while in operation—*also guaranteed.*

Among our customers are some of the best known Railroads, Waterworks; and Coke, Steel, Machinery, Paper, Soap, Chemical and Glass Manufacturers.

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NORTHWESTERN

Chimney Construction Co.

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A REPAIR JOB

NEW ERECTION

SIMPLICITY · DEPENDABLE · SIMPLICITY · DEPENDABLE

WHEN YOU UNDERSTAND SIMPLICITY ASPHALT PLANTS YOU WILL HAVE NO OTHER

SIMPLICITY SYSTEM COMPANY

CHATTANOOGA, TENNESSEE

Don't Overlook a Bet—

Last year some city and county officials and contractors, too, bought light, thin sheet-steel

Tar and Asphalt Kettles

when they could have Chausse boiler-plate kettles for the same price. Chausse kettles outlast 2 to 3 light ones. It pays to use them. Made in 1, 2, 3 and 6-barrel sizes. Hand spray pumps, warming hoods, barrel hoists can be furnished.

Other products—Street Repair Plants. Surface Heaters, Fire Wagons, Concrete Mixer Heaters, Kerosene Torches, Write for illustrated catalogs.

Chausse Oil Burner Company

Elkhart Indiana

"The Strongest Geared Power for Its Weight in the World"

CAPACITY 5 TONS STRAIGHT LINE

POSITIVE INTERNAL BRAKE

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Weight 110-lbs.

Size 16x17x13-in. high

Two Speeds 4 to 1 24 to 1

Write for descriptive circular with user's endorsements and name of nearest dealer.

Price $80 F. O. B., Warehouse Points Chicago, Brooklyn, New Orleans, Houston

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HONHORST TAR HEATERS

"Built for service"

ALL STYLES

Portable and Stationary

25 to 200 gallons

See our page in Street Construction Section, Municipal Index, for the Kettle you need.

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THE JOS. HONHORST CO.

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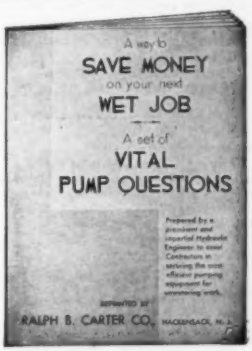
HUMDINGER

Answer to Every Pump Problem



Whether it is open excavation, well-point, sewage, pier hole or trench, this little booklet will save you many pump dollars on your next contract.

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Use this coupon

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Hackensack, N. J.

Please Send me booklet "A way to SAVE MONEY on your next WET JOB"

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High-Pressure Water Hose for Contractors

Many activities in construction require the use of a high-pressure hose line. Complete information regarding Continental Hi-Pressure water hose manufactured by the Continental Rubber Works, Erie, Pa., will be found in the complete contractors' catalog which will be sent free on request by this company.

An Easy Steering Motor Roller

Five models of motor road rollers in sizes from 6 to 15 tons with a number of special features, are offered by the Hercules Co., Marion, Ohio, and are described in Bulletin H-3100 which will be sent to interested contractors on request.

Details of Portable Compressor Construction

Bulletin C-6 of the Curtis Pneumatic Machinery Co., 1671 Kienlen Ave., St. Louis, Mo., describes the Curtis 80, 120, 180 and 240-cubic foot portable air compressors mounted on four rubber-tired wheels.

A New Double Drum Hoist

Novo Engine Co., 216 Porter St., Lansing, Mich., will be glad to send to those interested complete details on the NH-165 double drum hoist, among the features of which are a one-piece brake, the ratchet bolted to the drum, separate pawl and brake shafts, a real screw thrust, side frames separate from the base and a Novo 4-cylinder anti-friction engine.

Tar and Asphalt Kettles

Literature describing Chausse light, thin sheet-steel tar and asphalt kettles which are made in 1, 2, 3 and 6-barrel sizes, with hand spray pumps, warming hoods and barrel hoists as optional equipment, may be secured from the Chausse Oil Burner Co., Elkhart, Ind.

Lights for Construction Night Work

Catalogs describing the V-G carbide light, which spreads a full even beam of about 8,000 candlepower, lights up a job for about 9 hours on one 5-pound charge of National carbide and 5 gallons of water and is easily handled by one man as well as the V-G Handy light and lanterns, will be sent on request by the National Carbide Sales Corp., Lincoln Bldg., New York City.

Economical, Easily-Operated and Powerful Hoists

Complete information in regard to Clyde hoists which insure low operating and maintenance costs, easy operation, strength and power, may be secured by interested contractors from the Clyde Iron Works Sales Co., Duluth, Minn.

A Loader for Road Builders

N. P. Nelson Iron Works, Inc., 822 Bloomfield Ave., Passaic, N. J., will be glad to send to those interested complete information in regard to the Nelson Q-7 loader for stripping, finished grading, digging, batching or loading.

A Serviceable and Dependable Builder's Hoist

Catalog No. 32 containing full data on the Dake LG type builder's hoist, among the features of which are ease of operation, smooth running qualities, and are welded structural steel construction, will be sent on request by the Dake Engine Co., Grand Haven, Mich.

Accuracy and Precision in Water Meters

Complete information in regard to Trident and Lambert meters, which are made of uniform bronze for strength and wear resistance and every step in the production of which is controlled by exact precision standards to insure accuracy and interchangeability of these meters, may be secured from the Neptune Meter Co., 50 East 42nd St., New York City.

Lubricant for Construction Equipment

D-A Lubricant Co., Inc., Indianapolis, Ind., will be glad to send to those interested complete information in regard to the D-A lubricant which clings to the metal, keeps bearing surfaces apart and protects them against mud, water, sand and dust.

A Pile Hammer for Every Purpose

Catalog No. 40 describing the complete line of McKiernan-Terry steam pile hammers for all types of service may be secured by interested contractors from McKiernan-Terry Corp., 19 Park Row, New York City.

An Oil, Tar and Asphalt Distributor

The Etnyre Model F oil, tar and asphalt distributor for building and maintaining bituminous roads is described in detail in Bulletin No. 503 which E. D. Etnyre & Co., Oregon, Ill., will be glad to send on request.

A Complete Line of Hoists and Derricks

Special bulletins describing the complete line of Lidgerwood steam and belt hoists, cableways, gasoline hoists, capstans, wire rope blocks, electric hoists, derricks, winches and special equipment may be secured on request from the Lidgerwood Manufacturing Co., 430 Lidgerwood Ave., Elizabeth, N. J.

A New General Purpose Motor

Complete details in regard to the new Lauson 4-cycle type general purpose motor for powering washing plants, water systems, electric light plants, centrifugal pumps and similar uses may be secured from the Lauson Corp., 100 Ogden Ave., New Holstein, Wis.

A Complete Line of Wheelbarrows and Carts

General Wheelbarrow Co., 3140 East 65th St., Cleveland, Ohio, will be glad to send to those interested complete details in regard to the line of General wheelbarrows and concrete carts as well as road grader blades, scrapers, steel mortar boxes, road plows, rooters, road drags and other highway construction equipment.

Concrete Facts for Concrete Contractors

This is the title of a new booklet which deals with the problems and methods of concrete making, including facts on colored concrete, special surface finishes, forms, watertight concrete and cold weather construction. Copies may be secured by interested contractors from the Portland Cement Association, 33 West Grand Ave., Chicago, Ill.

Precision-Built 2 and 4-Cylinder L-Head Engines

Gasoline engines representing the latest practice in modern engine construction, yet embodying nothing that is untried or un-accepted, are included in the 2-cylinder, 3 to 6-horsepower and the 4-cylinder 7 to 12-horsepower L-head line of engines announced by the LeRoi Co., Milwaukee, Wis., and described in its Bulletin 311.

A Joint Filler and Traffic Line Marker

A small piece of equipment, moved by hand and equipped with two gasoline burners to insure the proper temperature of the materials is made by Littleford Brothers, 485 East Pearl St., Cincinnati, Ohio. This No. 91 joint filler and traffic line marker is described in a catalog which will be sent on request.

A 25-Ton Gasoline Locomotive

The Mid-West Locomotive Works, Hamilton, Ohio, has issued an interesting illustrated folder describing its heavy-duty gasoline locomotive with four-speed transmission and a multiplying gear which gives a high speed range and in which it is possible to shift gears on a grade.

A New ¾-Yard Full-Revolving Shovel

A compact ¾-yard shovel with a wide, profitable service range for the contractor and which may be used as a clamshell, crane, dragline and backfiller, is described in a folder which the Buckeye Traction Ditcher Co., Findlay, Ohio, will be pleased to send on request.

A New Hydraulic Roll-Over Scraper

Bulletin 193 describing the new roll-over scraper with hydraulic control which gives the operator the ability to instantly control and vary the cutting depth by merely shifting a lever from his seat, may be secured on request from the LaPlant-Choate Mfg. Co., Inc., Cedar Rapids, Iowa.

Dependable Hot-Mix Asphalt Plants

Complete information regarding a hot mix asphalt plant for sand asphalt and bituminous concrete which operates as a unit giving uniform results at reasonable cost and with low operating and maintenance charges, may be secured from the Simplicity System Co., Chattanooga, Tenn.

A New Model Self-Feeding Bucket Loader

Folder No. 1256 of the Link-Belt Co., 910 South Michigan Ave., Chicago, Ill., describes the improved 1931 Model Link-Belt Grizzly crawler loader with helical ribbon-type feeders which dig, lift and convey the material to the buckets, cutting a 7-foot, 7-inch wide swathe in the material being handled.

A Tractor-Operated Scraper

Folder 485 of the Willamette-Erated Co., Portland, Ore., describes the Hyster scraper, a heavy-duty scraper which speeds up work, lowers cost and enables contractors to bid lower and make greater profits.

A Handbook of Scraper Mucking

Sullivan Machinery Co., 814 Wrigley Bldg., Chicago, Ill., has just published a book on scraper mucking which is listed at $2. This book deals primarily with metal mining practice but much of the material applies to tunnel driving problems and hence is of interest and value to public works contractors.

A Patrol or Planer With Power Control

With the Caterpillar Trailer Patrol or Planer hitched to a Caterpillar tractor equipped with the new power control, recently announced by the Caterpillar Tractor Co., Peoria, Ill., and described in Form P905, the operator controls blade operations without manual effort except through the manipulation of conveniently placed control levers.

A New Oil Burning Heater

The Jos. Honhorst Co., 1016 W. 6th St., Cincinnati, Ohio, will be glad to send to those interested Pamphlet No. 15, describing the new Honhorst oil burning heater, as well as other literature describing the complete line of Honhorst portable and stationary tar heaters.

Corrugated Drainage Culverts

Complete information in regard to Gohi corrugated pure iron-copper alloy base metal culverts, which are easy to handle, simple and economical to install and durable, may be secured from the Gohi Culvert Manufacturers, Inc., Newport, Ky.

A New Skip Mixer Scale

Literature describing the new Fairbanks skip mixer scale which is a self-contained type of scale arranged to be transported on a two-wheeled trailer and used in the field for accurately weighing all aggregates will be sent to interested contractors on request by Fairbanks, Morse & Co., Chicago, Ill.

An Improved Heater for Asphalt Tank Cars

The J. C. Cleaver Co., Inc., Oregon, Ill., has issued a 4-page circular describing the Cleaver tank car heater which has sufficient capacity to heat three tank cars at one time and burns approximately 5 gallons of fuel per hour.

A Trailer for Handling Equipment Up to 14 Tons

A new 4-wheel trailer developed for carrying the 10-ton Bay City ¾-yard shovel, the 14½-ton Model K Bay City revolving shovel or heavy equipment of other makes up to 14 tons in weight, has been announced by Bay City Shovels, Inc., Bay City, Mich., who will be pleased to send complete information on request.

A One-Man Portable Pump

An open impeller type pump with a capacity of 15,000 gallons per hour and which will pump air and water, handling dirty, gritty water with a 25-foot suction lift, has been placed on the market by the Sterling Machinery Corp., 2303 Holmes St., Kansas City, Mo., and is described in literature which may be secured on request.

Economical Handling of Bulk Cement

A helpful text "Analysis of Savings by the Use of Bulk Cement in Paving Work" has been prepared by the C. S. Johnson Co., Champaign, Ill., and will be sent to any contractors, both highway and building, who may be interested in the advantages and economies of bulk cement.